Heathkit HS-161

Schematics
And
Drawings

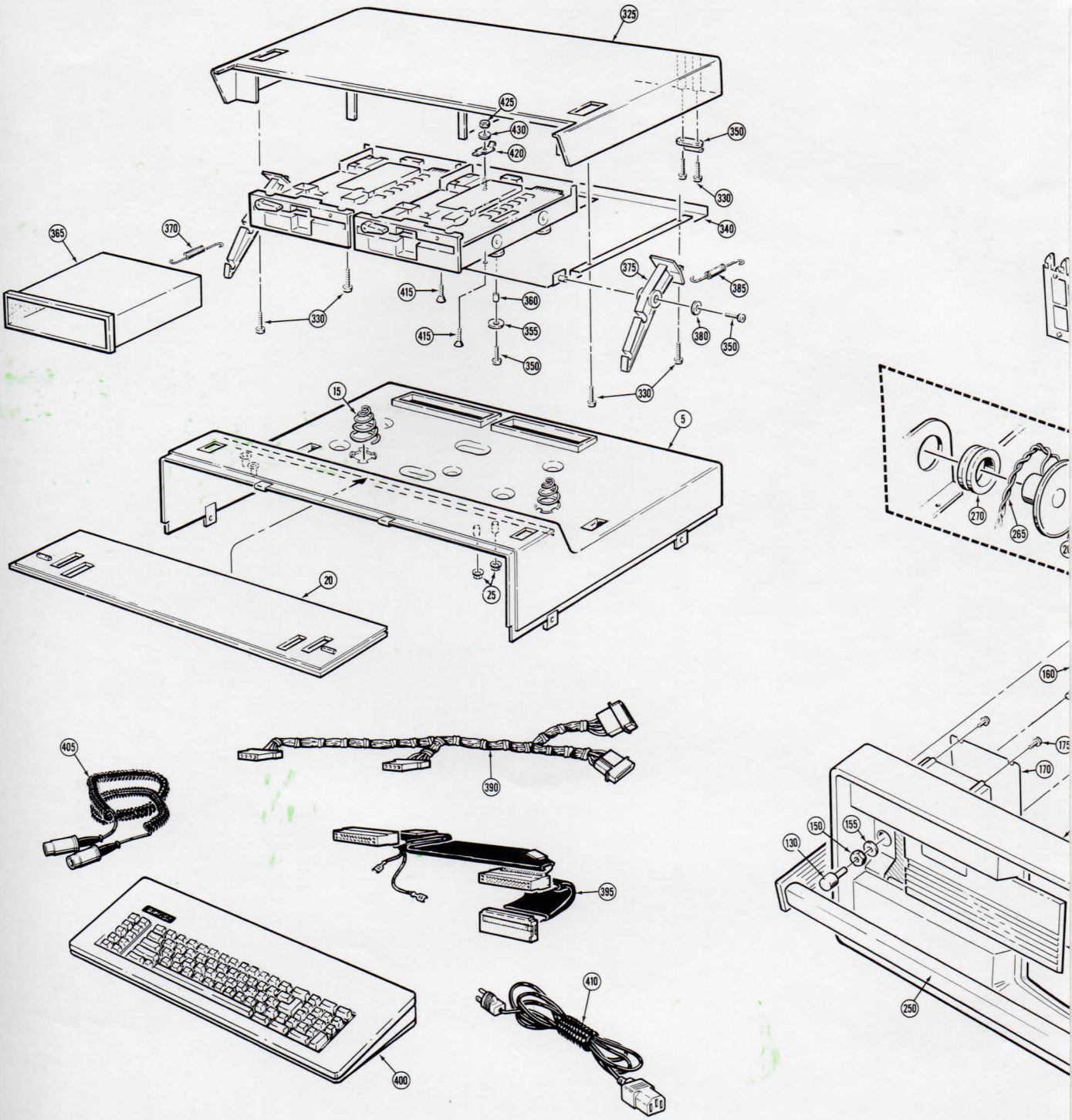
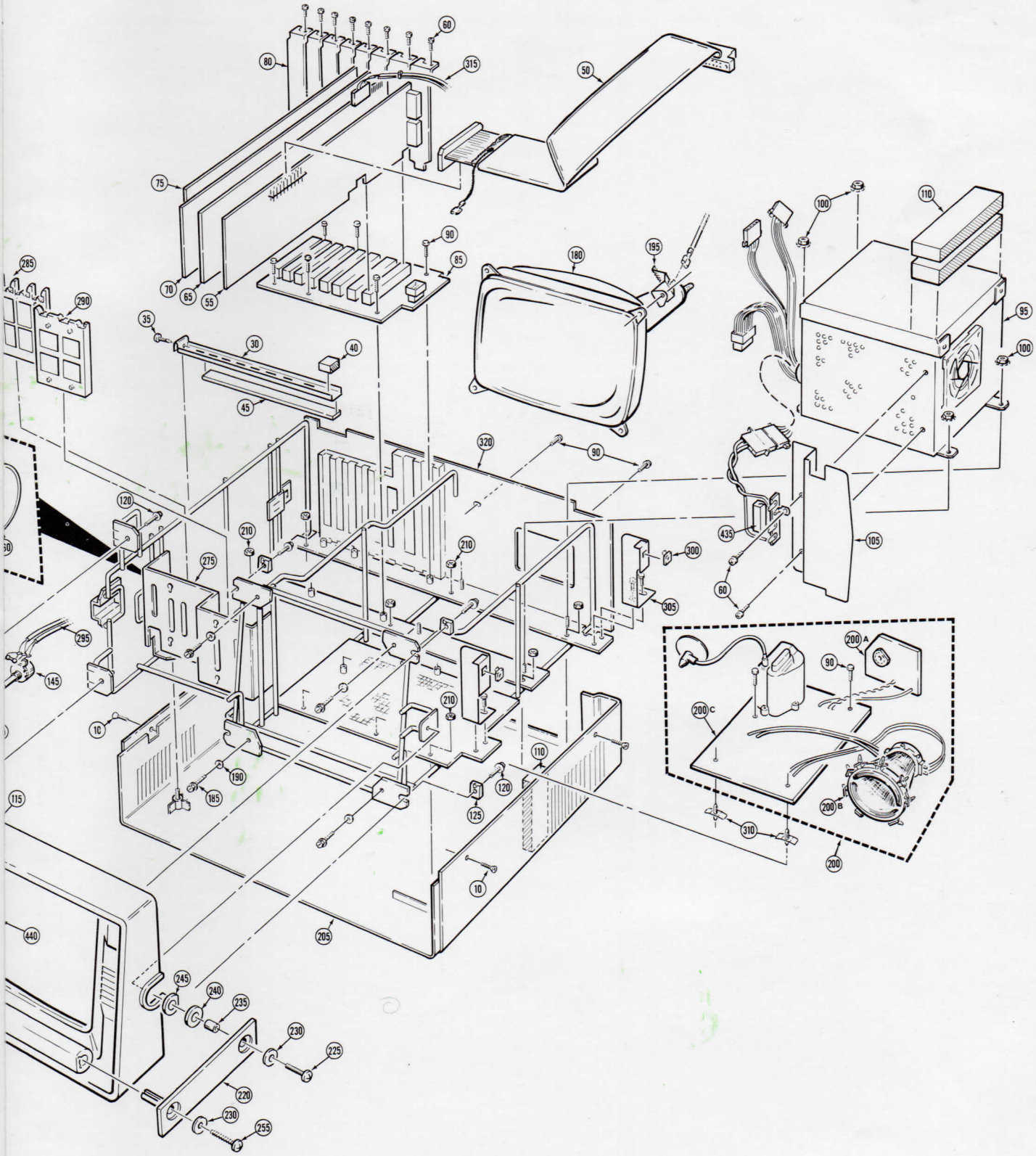


Figure 4.2. Z-16



60 Disassembly View

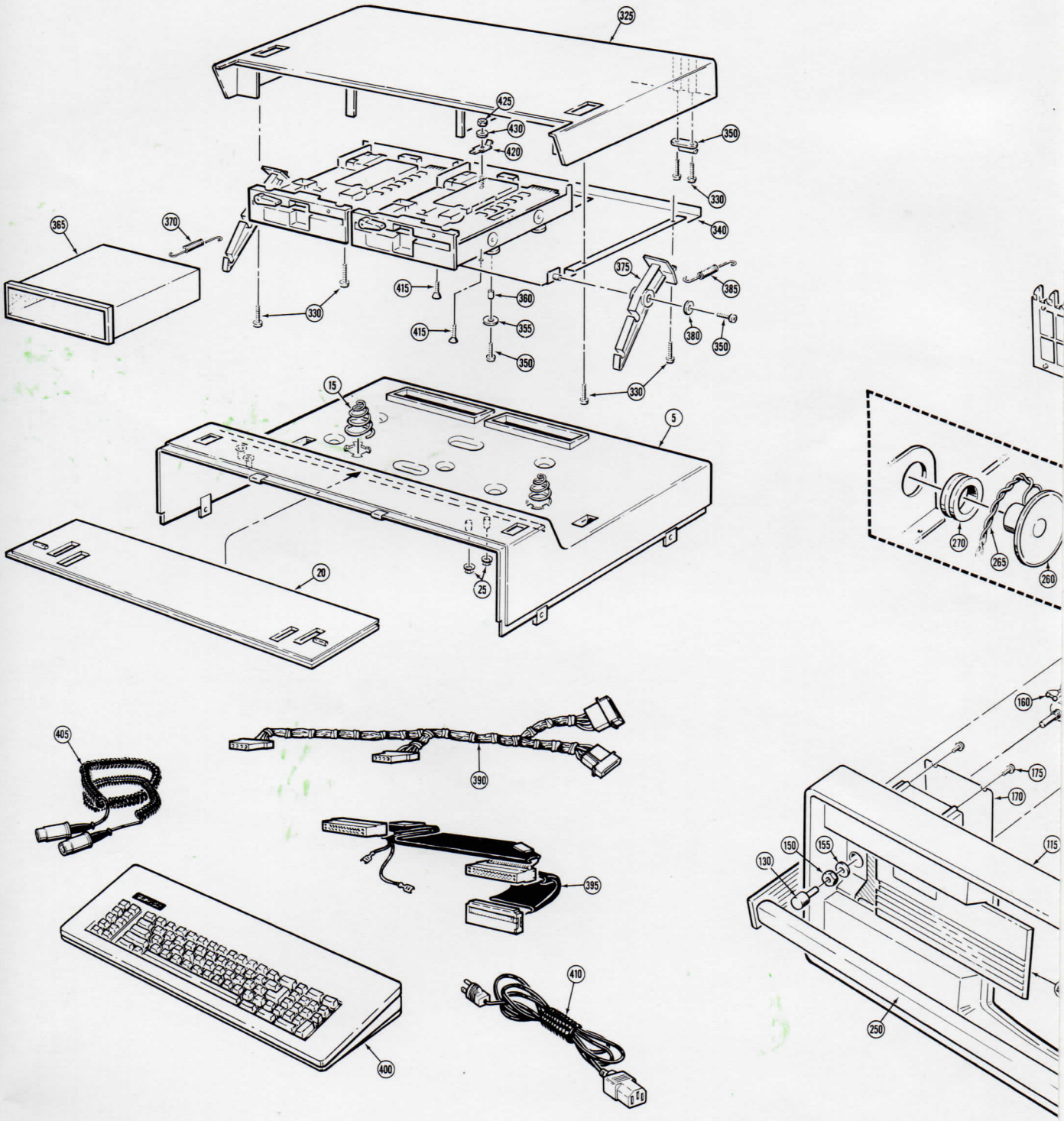
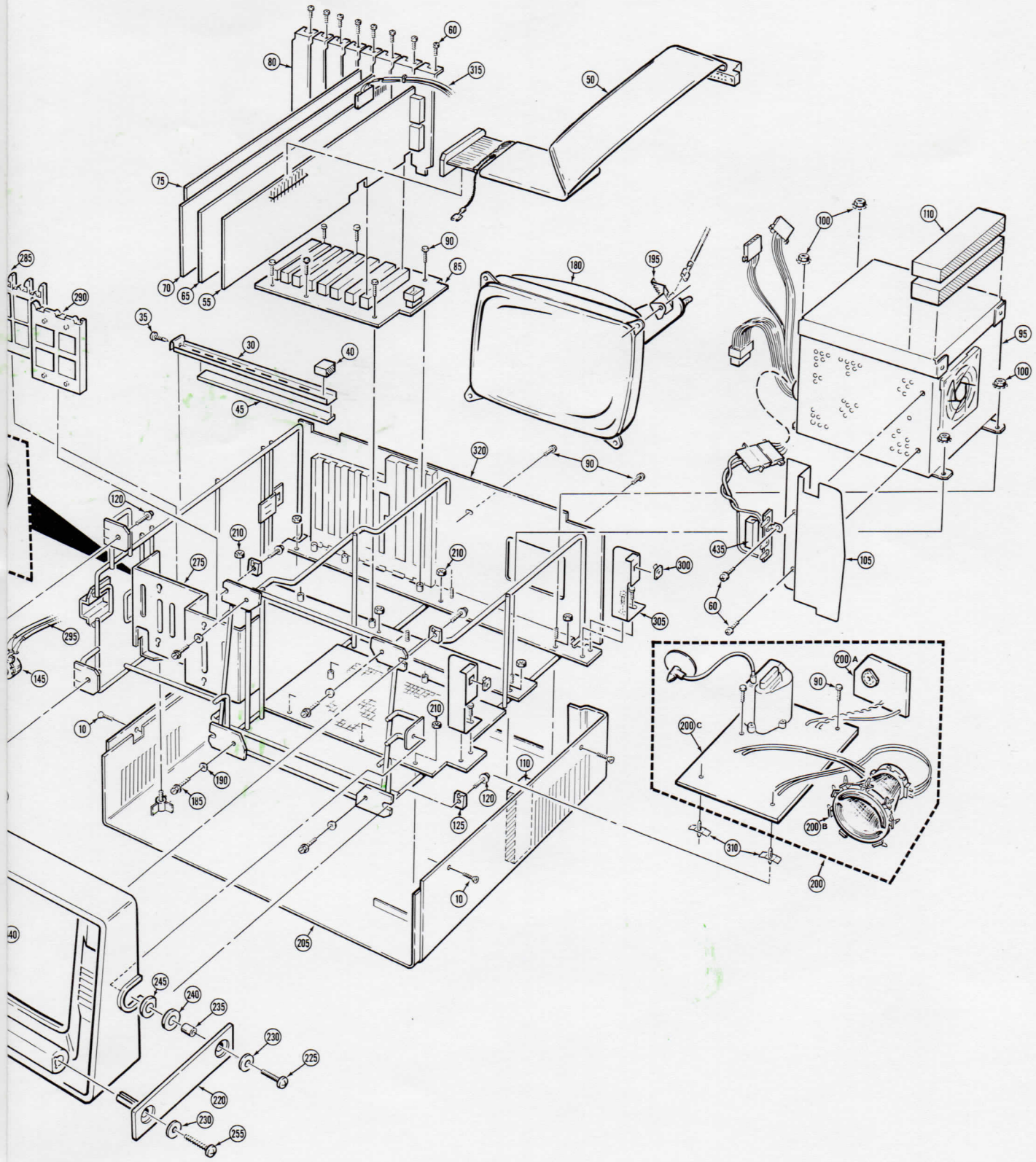


Figure 6.2. Z-16



) Reassembly View

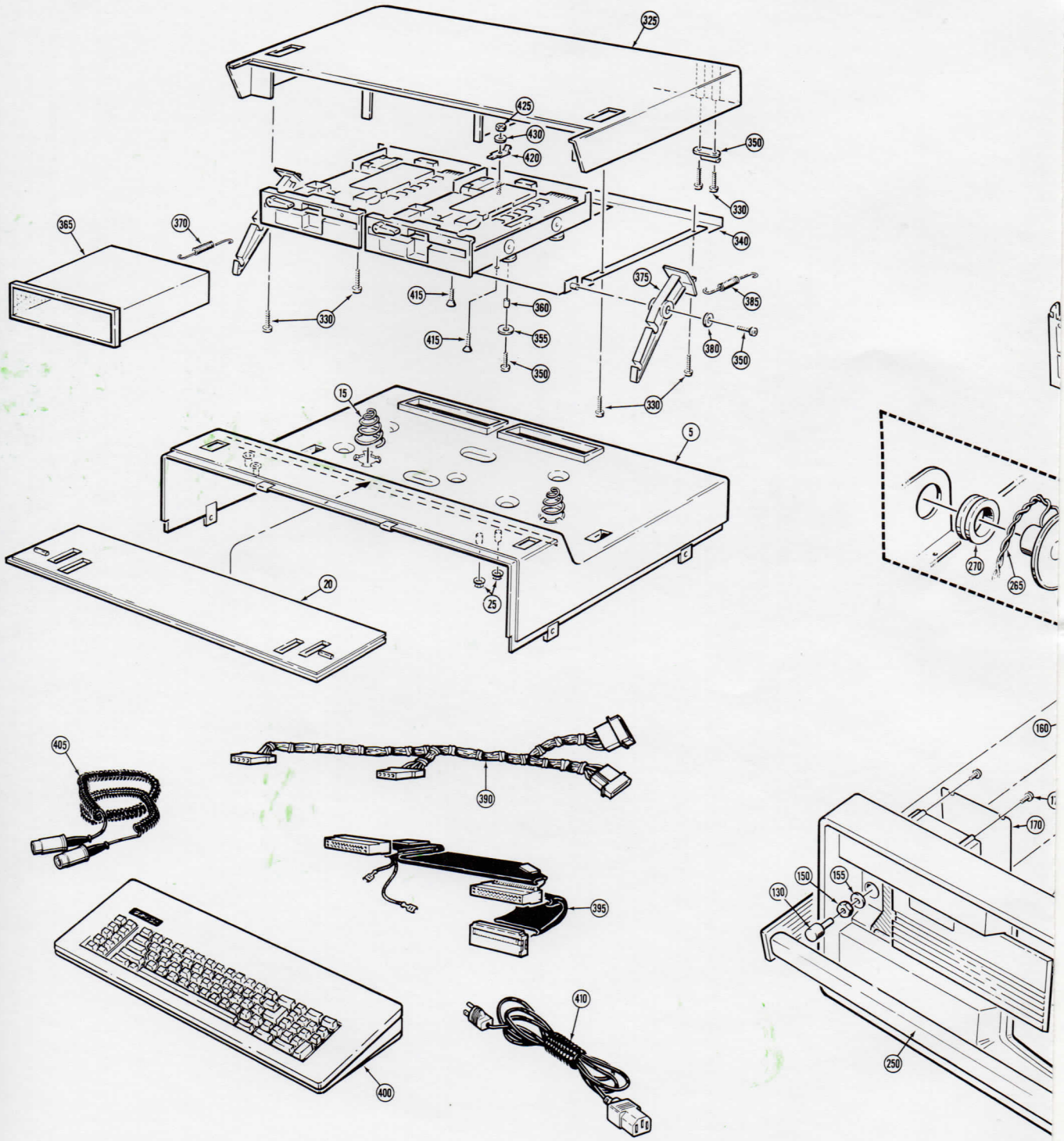
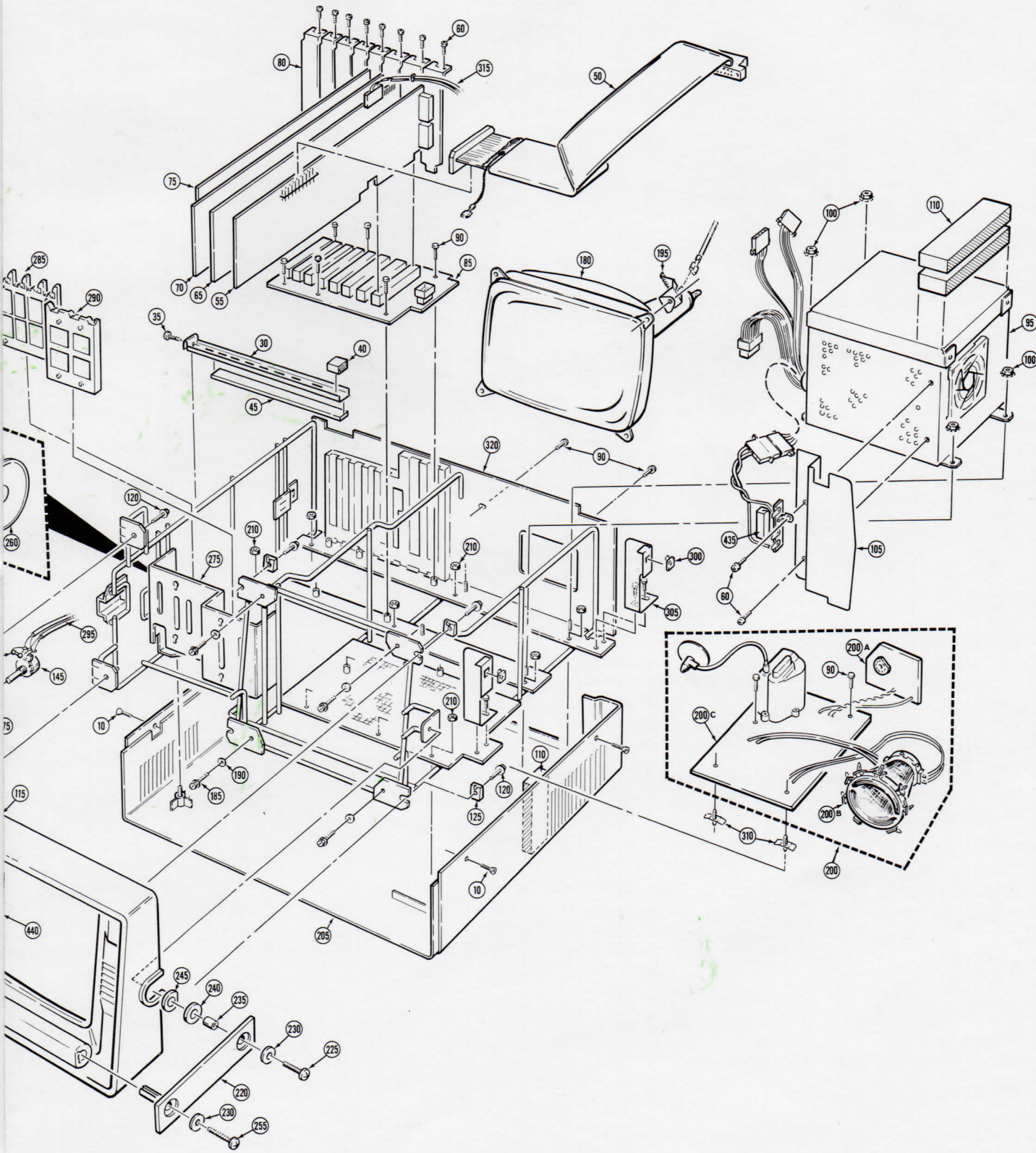

325
425
430
420
350
330
340
365
370
415
330
360
355
350
375
385
380
350
330
15
5
20
25
270
265
405
390
160
170
150
155
130
395
410
400
250

Figure 7.1. Z-



·160 Exploded View

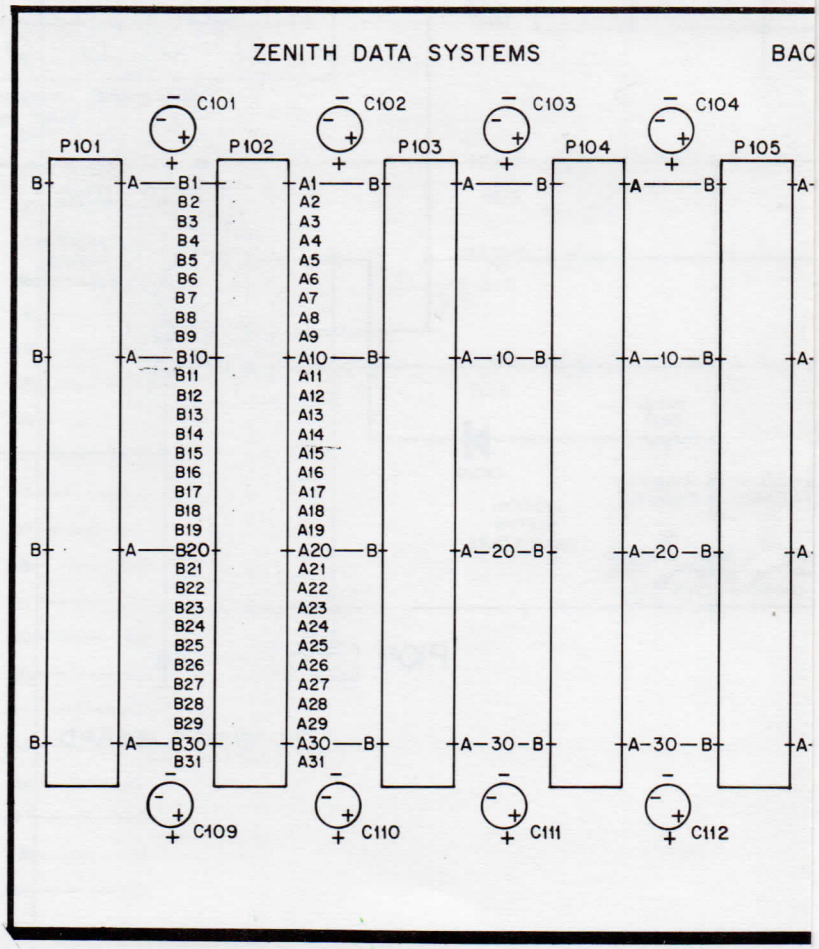
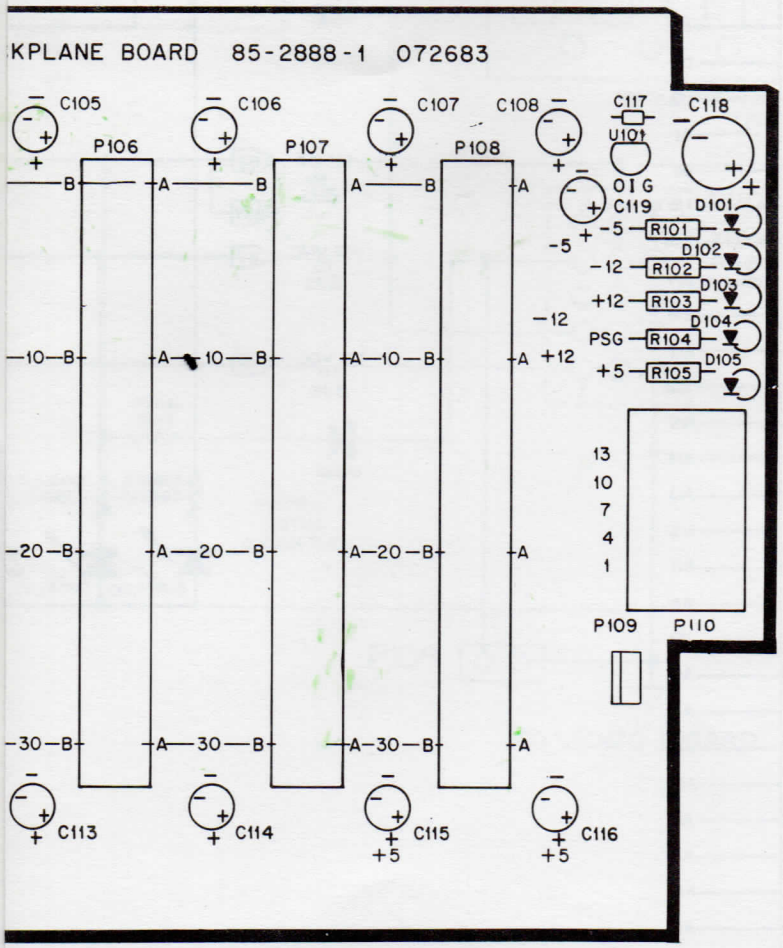
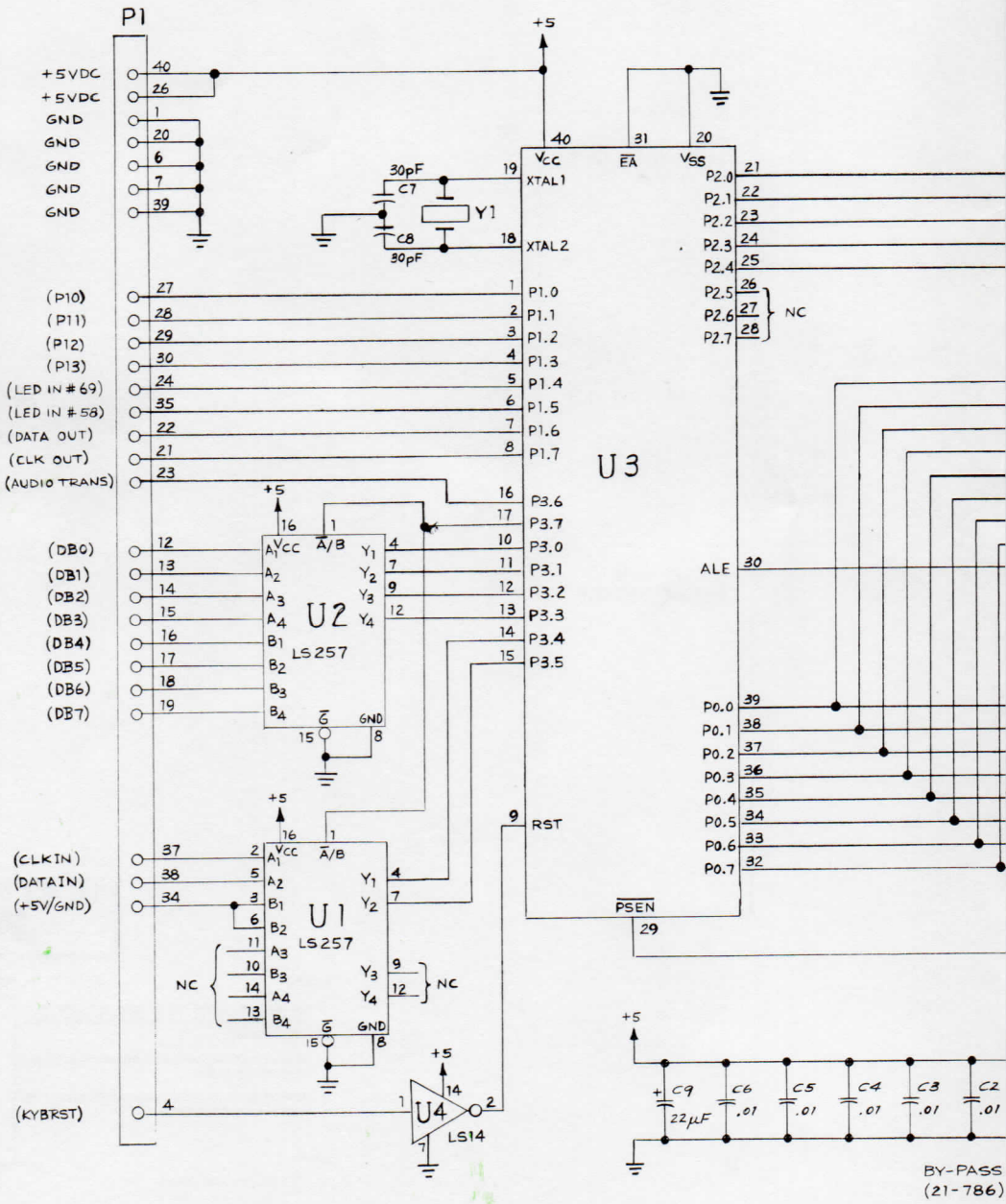
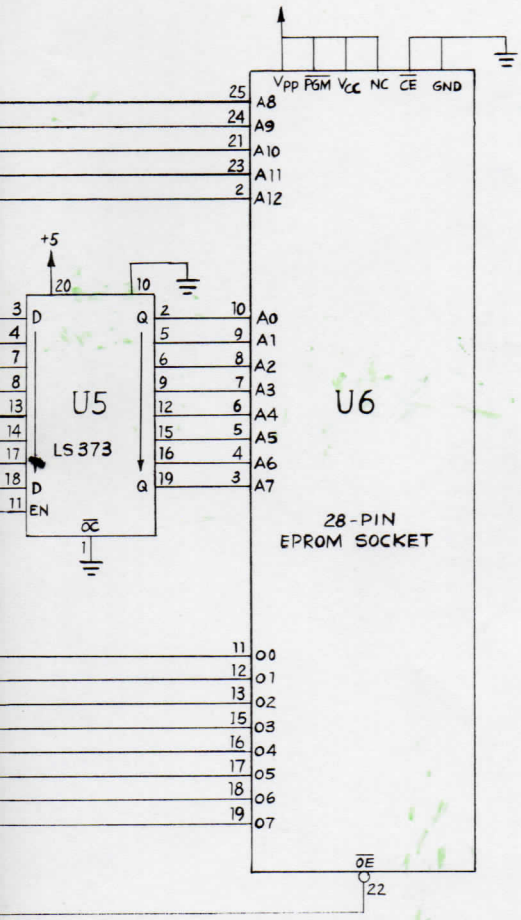


Figure 5.1. Backplane Boa



rd Component Layout


P1
+5VDC
+5VDC
GND
GND
GND
GND
GND
(P10)
(P11)
(P12)
(P13)
(LED IN #69)
(LED IN #58)
(DATA OUT)
(CLK OUT)
(AUDIO TRANS)
(DB0)
(DB1)
(DB2)
(DB3)
(DB4)
(DB5)
(DB6)
(DB7)
(CLKIN)
(DATAIN)
(+5V/GND)
(KYBRST)
U1
U2
LS257
U4
LS14
U3
30pF
C7
C8
30pF
Y1
XTAL1
XTAL2
P1.0
P1.1
P1.2
P1.3
P1.4
P1.5
P1.6
P1.7
P3.6
P3.7
P3.0
P3.1
P3.2
P3.3
P3.4
P3.5
RST
PSEN
ALE
P2.0
P2.1
P2.2
P2.3
P2.4
P2.5
P2.6
P2.7
NC
P0.0
P0.1
P0.2
P0.3
P0.4
P0.5
P0.6
P0.7
C9
22µF
C6
.01
C5
.01
C4
.01
C3
.01
C2
.01
BY-PASS
(21-786)



C1
.01

HEATH ZENITH

NOTES:

1. ALL RESISTOR VALUES ARE IN OHMS (k = 1,000, M = 1,000,000) ALL RESISTORS ARE 1/4-WATT, 5% UNLESS OTHERWISE SPECIFIED.
2. ALL CAPACITOR VALUES ARE IN µF (MICROFARADS), UNLESS OTHERWISE SPECIFIED.
3. REFER TO THE CIRCUIT BOARD COMPONENT VIEW FOR THE PHYSICAL LOCATION OF PARTS.

LEGEND:

1. CIRCUIT BOARD GROUND
2. +5 V
3. BUS SIGNAL
4. MECHANICAL CONNECTION
5. DIRECTION TO
6. DIRECTION FROM
7. NO CONNECTION
8. CONNECTION

PARTS ORDERING INFORMATION:

If you order a part from Zenith Data Systems, use the (HE) prefix. Example:

HE 443-730

If you order a part from Heath Company, DO NOT use the (HE) prefix. Example:

443-730

For semiconductor type numbers (Example: 74LS153), refer to the "Semiconductor Identification Chart."

585-61-04
8048 EMULATOR

SHEET 1 OF 2

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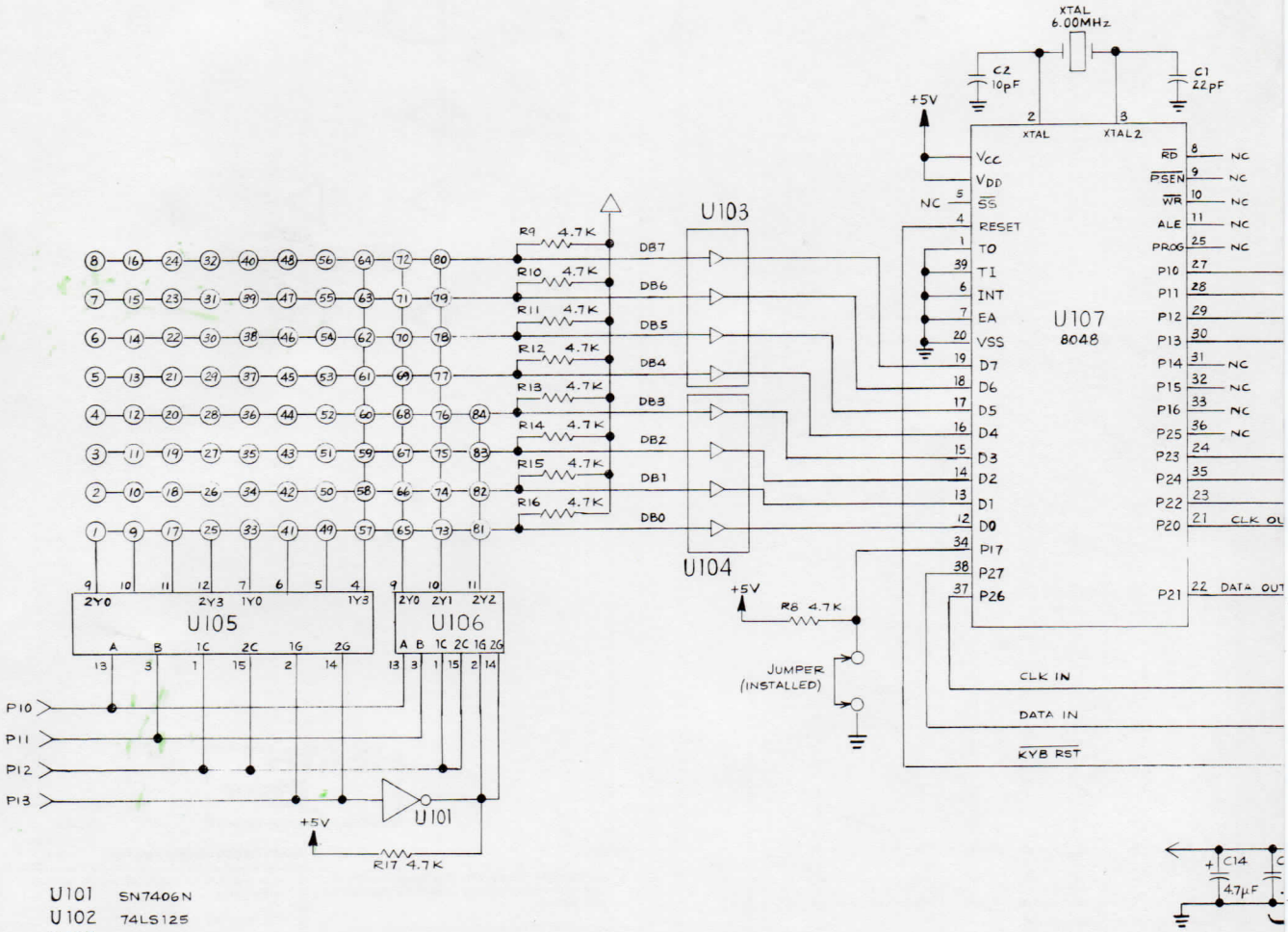
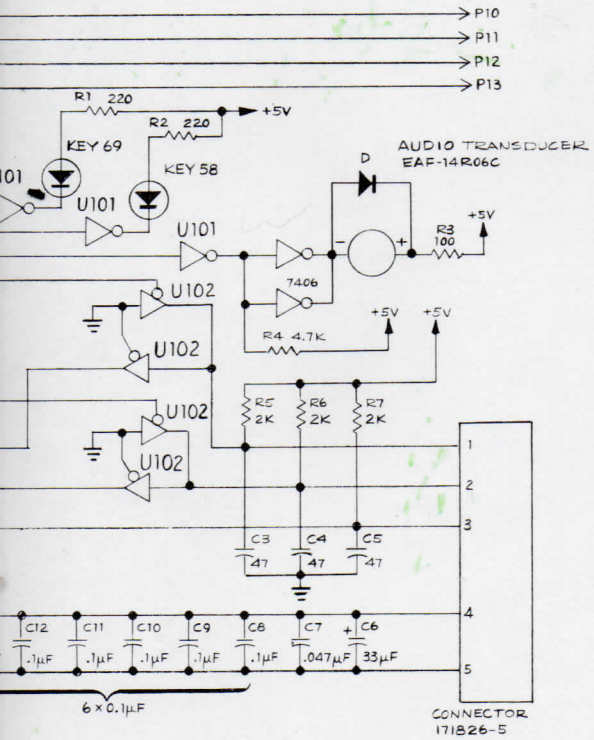
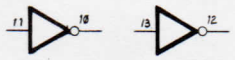


U101	SN7406N
U102	74LS125
U103	MC14050BCP
U104	MC14050BCP
U105	74LS156
U106	74LS156
U107	8748/8048

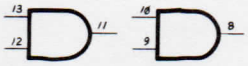


EXTRA GATES:

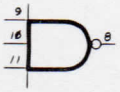
U234
443-755



U219
443-780



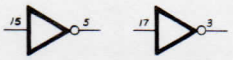
U224
443-1047



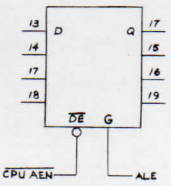
U203
443-1084

U221
443-1172

U233
443-754



U242
443-837



EXTRA RESISTORS:

RP1	.1Ø	4.7KΩ
RP2	.1Ø	4.7KΩ
RP3	.9.1Ø	4.7KΩ
RP5	.5	2.2KΩ

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NOTES:

1. ALL RESISTOR VALUES ARE IN OHMS (k = 1,000, M = 1,000,000) ALL RESISTORS ARE 1/4-WATT, 5% UNLESS OTHERWISE SPECIFIED.
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3. REFER TO THE CIRCUIT BOARD COMPONENT VIEW FOR THE PHYSICAL LOCATION OF PARTS.

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6. DIRECTION FROM
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PARTS ORDERING INFORMATION:

If you order a part from Zenith Data Systems, use the (HE) prefix. Example:

HE 443-730

If you order a part from Heath Company, DO NOT use the (HE) prefix. Example:

443-730

For semiconductor type numbers (Example: 74LS153), refer to the "Semiconductor Identification Chart."

585-61-04
KEYBOARD

SHEET 2 OF 2

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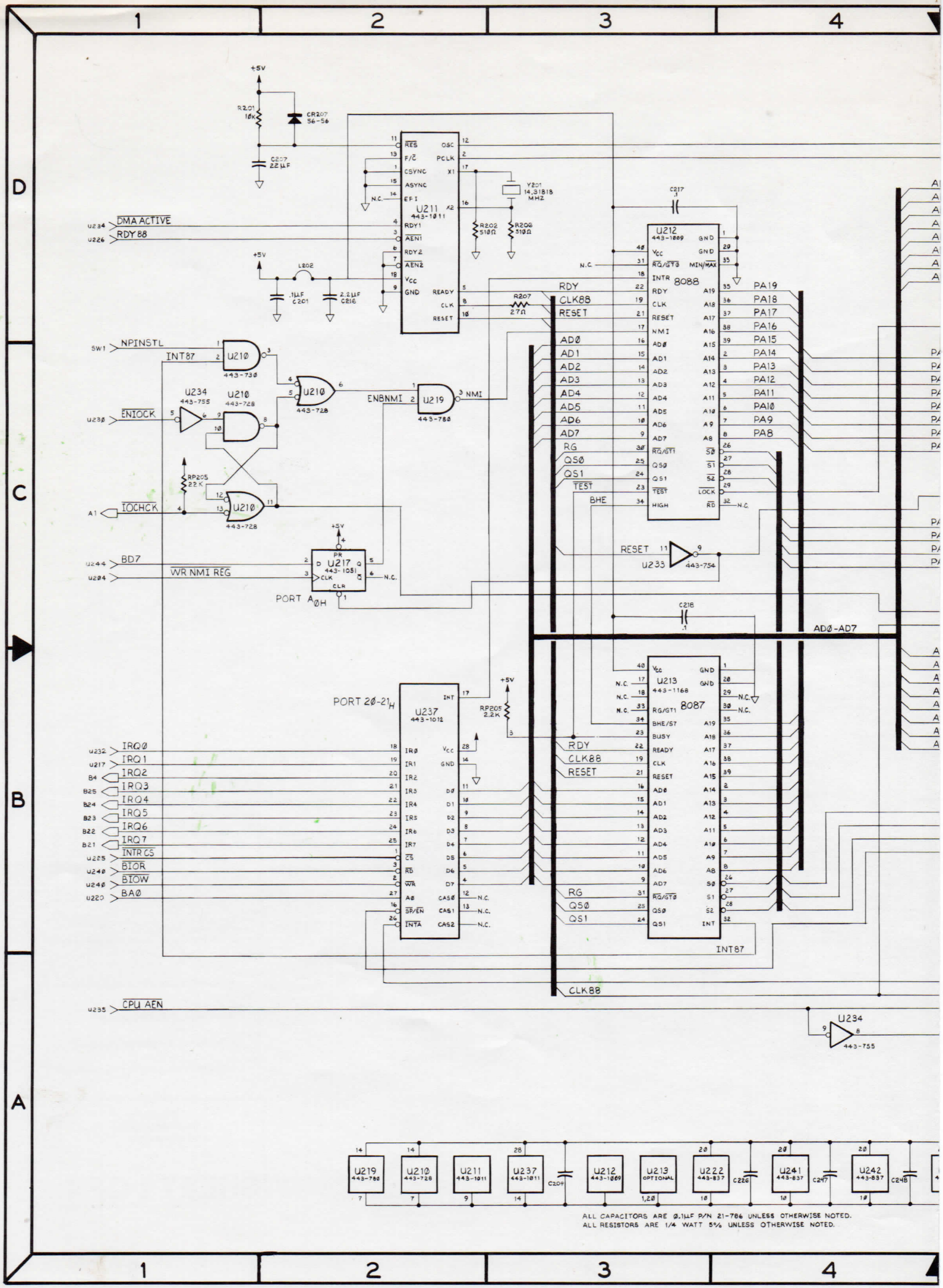
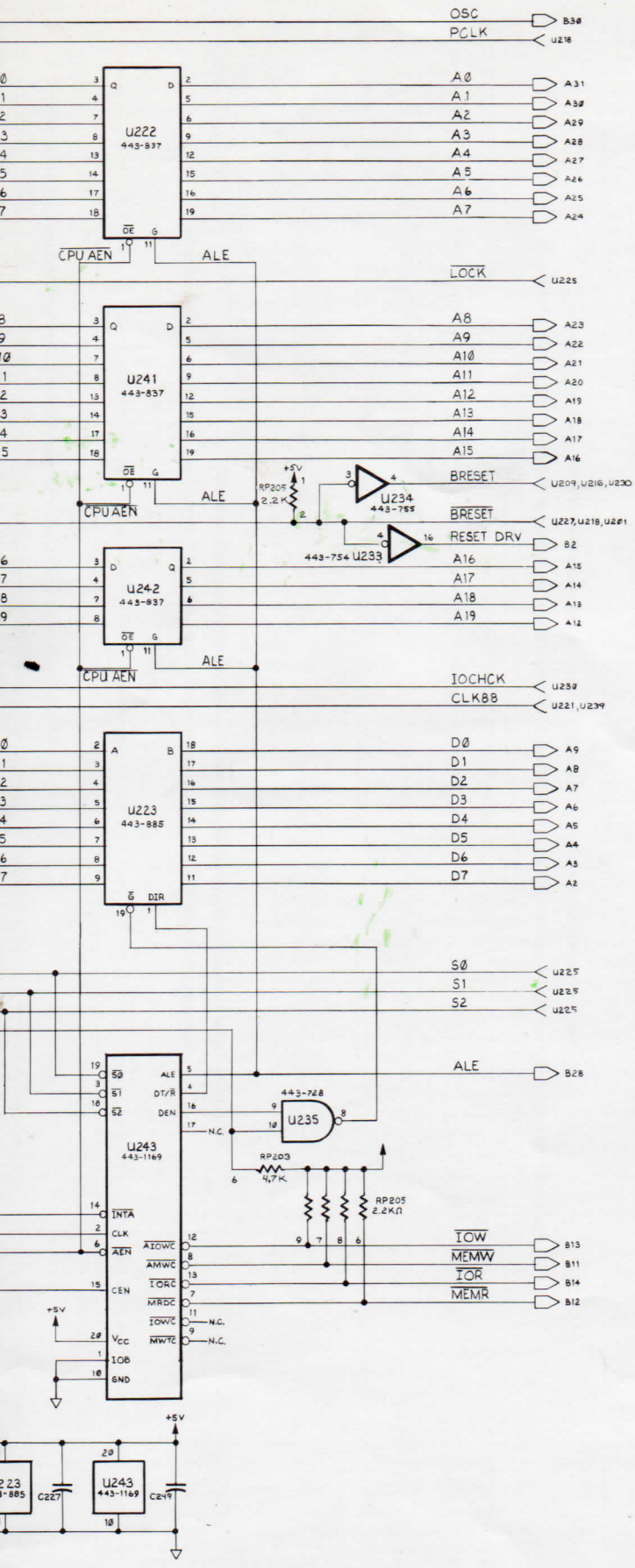


U211 443-1011
U212 443-1009
8088
U213 443-1168
8087
U217 443-1051
U237 443-1012
U234 443-755
U210 443-728
U219 443-780
U233 443-754
U234 443-755
U219 443-780
U210 443-728
U211 443-1011
U237 443-1011
U212 443-1009
U213 OPTIONAL
U222 443-837
U241 443-837
U242 443-837
DMA ACTIVE
RDY 88
NPINSTL
INT87
ENIOCK
IOCHCK
BD7
WR NMI REG
ENBNMI
NMI
PORT A0H
PORT 20-21H
IRQ0
IRQ1
IRQ2
IRQ3
IRQ4
IRQ5
IRQ6
IRQ7
INTR CS
BIOR
BIOW
BA0
CPU AEN
AD0-AD7
RDY
CLK88
RESET
RG
QS0
QS1
TEST
BHE
PA19
PA18
PA17
PA16
PA15
PA14
PA13
PA12
PA11
PA10
PA9
PA8
+5V
R201 10K
CR207 56-56
C207 22µF
Y201 14.31818 MHZ
R202 510Ω
R206 510Ω
L202
.1µF C201
2.2µF C216
R207 27Ω
C217 .1
C218 .1
RP205 22K
RP205 2.2K
ALL CAPACITORS ARE 0.1µF P/N 21-786 UNLESS OTHERWISE NOTED.
ALL RESISTORS ARE 1/4 WATT 5% UNLESS OTHERWISE NOTED.



HEATH ZENITH

NOTES:

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6. DIRECTION FROM
7. NO CONNECTION
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PARTS ORDERING INFORMATION:

If you order a part from Zenith Data Systems, use the (HE) prefix. Example:

HE 443-730

If you order a part from Heath Company, DO NOT use the (HE) prefix. Example:

443-730

For semiconductor type numbers (Example: 74LS153), refer to the "Semiconductor Identification Chart."

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Z-150 DMA CONTROLLER, ROMS AND BUS BUFFERS CPU CARD

Sheet 2 of 4
Z-150 PROCESSOR AND SUPPORTS CPU CARD

Sheet 3 of 4
Z-150 DMA CONTROL, WAIT LOGIC, DECODE CPU CARD

Sheet 4 of 4
Z-150 TIMER, KEYBOARD, SOUND AND SWITCHES CPU CARD

585-62
H-160 PROCESSORS
AND SUPPORT

SHEET 1 OF 4

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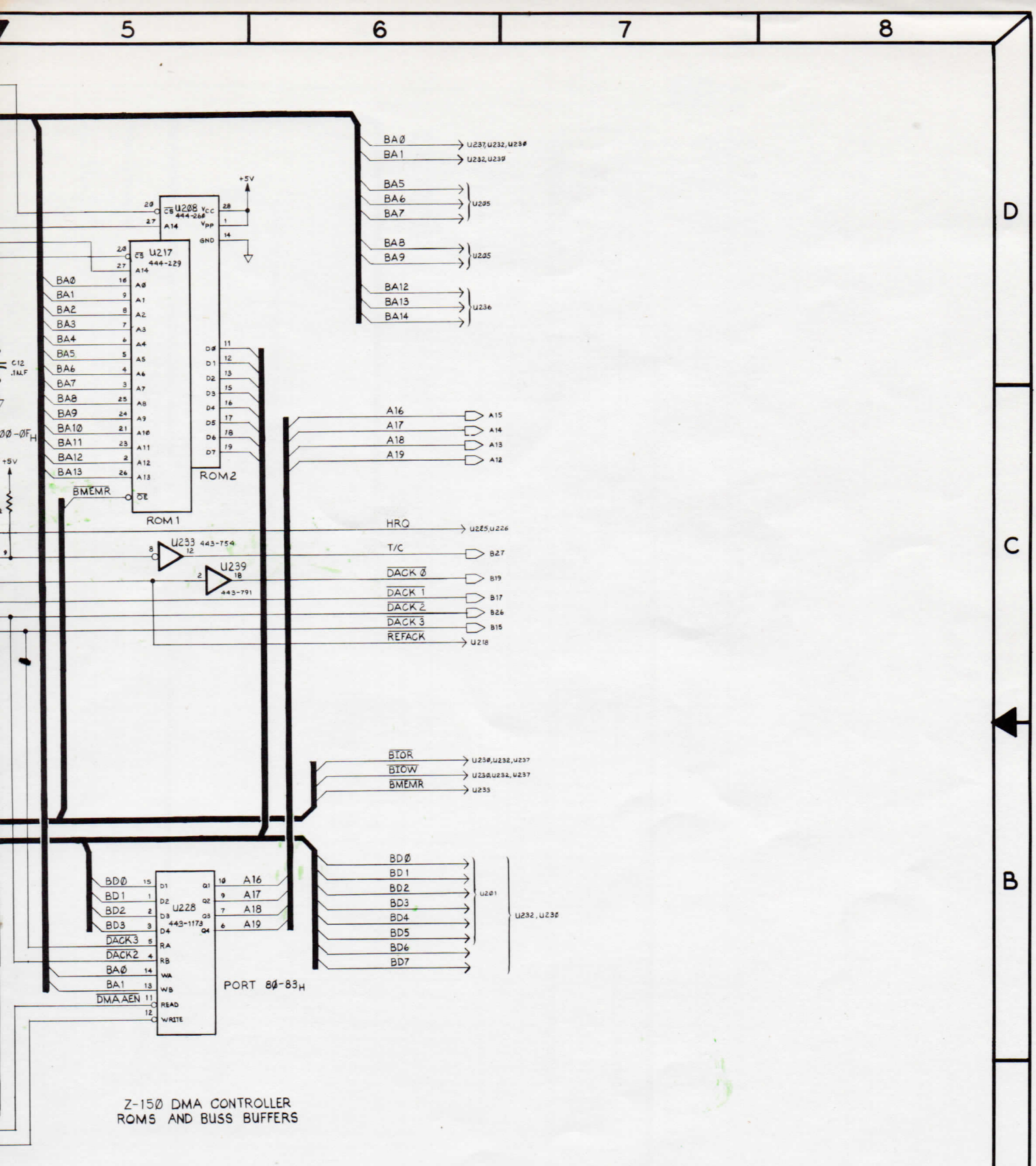
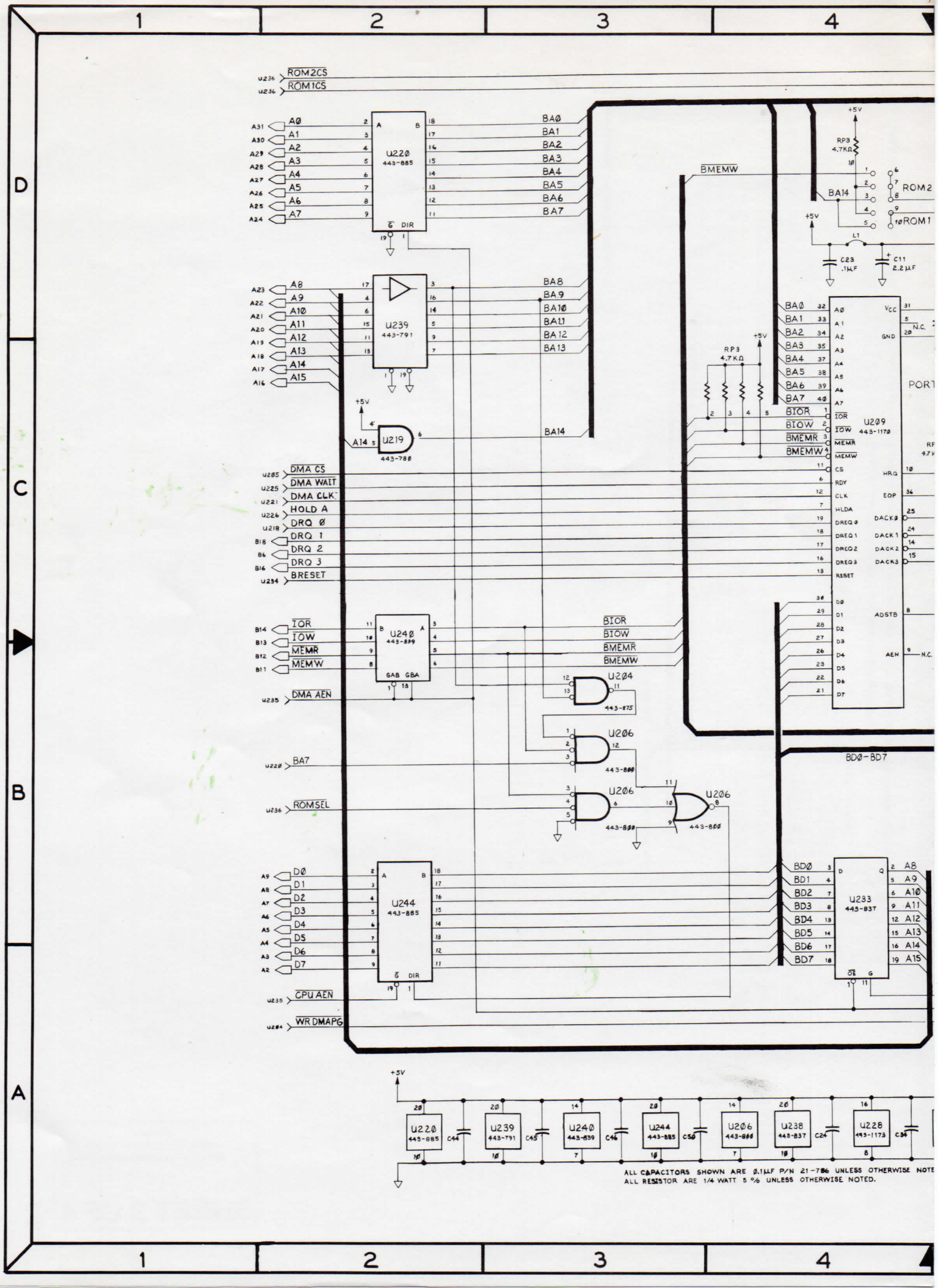
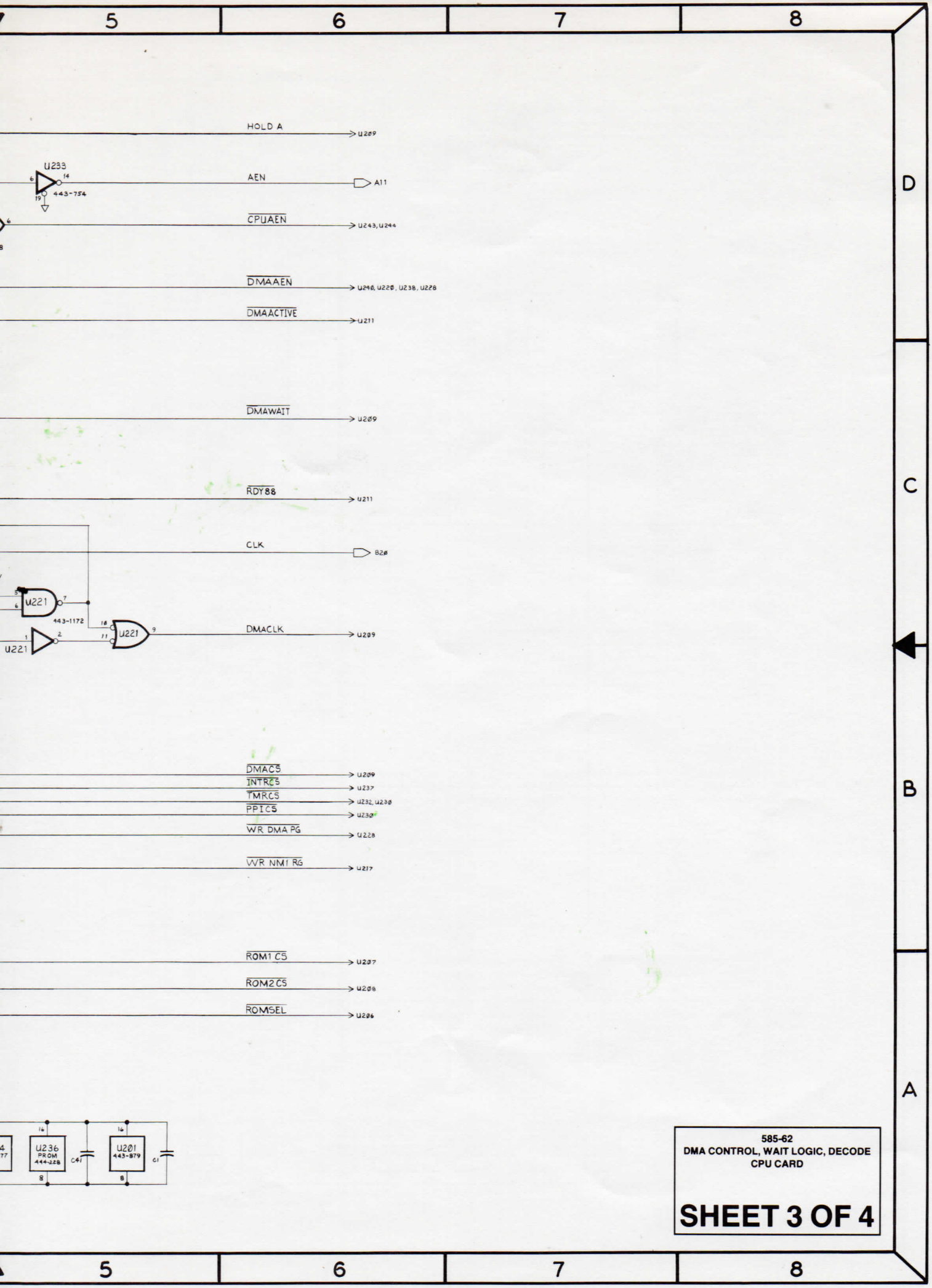
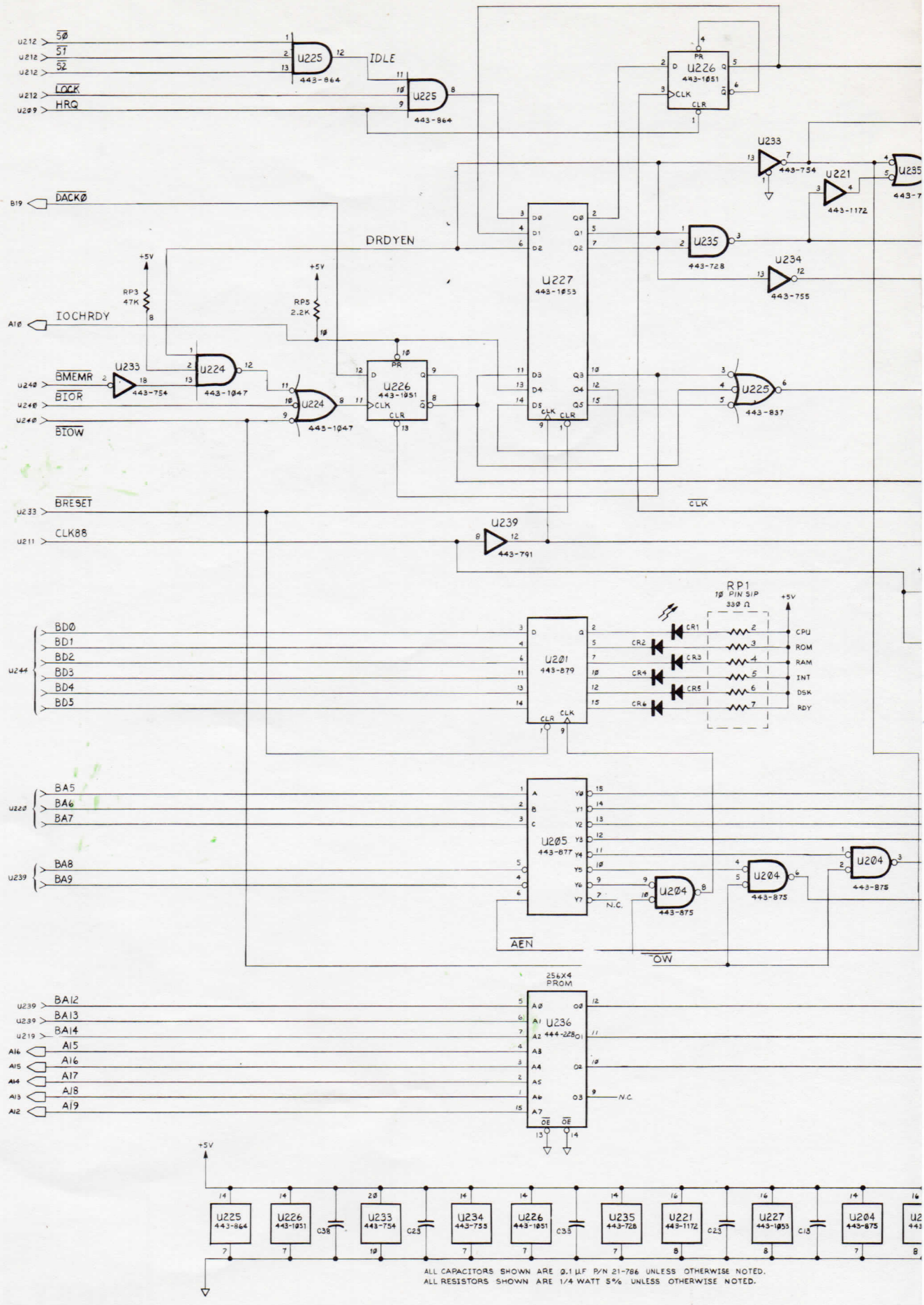


585-62
DMA CONTROLLER, ROMS
AND BUS BUFFERS CPU CARD

SHEET 2 OF 4


ROM2CS
ROM1CS
U220
443-885
U239
443-791
U219
443-788
U240
443-839
U244
443-885
U204
443-875
U206
443-888
U209
443-1170
U233
443-837
U238
443-837
U228
443-1173
BMEMW
BIOR
BIOW
BMEMR
BMEMW
BA0
BA1
BA2
BA3
BA4
BA5
BA6
BA7
BA8
BA9
BA10
BA11
BA12
BA13
BA14
ROM2
ROM1
PORT
BD0-BD7
DMA CS
DMA WAIT
DMA CLK
HOLD A
DRQ 0
DRQ 1
DRQ 2
DRQ 3
BRESET
DMA AEN
BA7
ROMSEL
CPU AEN
WR DMAPG
+5V
ALL CAPACITORS SHOWN ARE 0.1µF P/N 21-786 UNLESS OTHERWISE NOTE
ALL RESISTOR ARE 1/4 WATT 5 % UNLESS OTHERWISE NOTED.


5
6
7
8
D
C
B
A
HOLD A
U209
U233
443-754
AEN
A11
CPUAEN
U243, U244
DMAAEN
U240, U220, U238, U228
DMAACTIVE
U211
DMAWAIT
U209
RDY88
U211
CLK
B20
U221
443-1172
U221
U221
DMACLK
U209
DMACS
U209
INTRCS
U237
TMRCS
U232, U230
PPICS
U230
WR DMA PG
U228
WR NMI RG
U217
ROM1 CS
U207
ROM2 CS
U208
ROMSEL
U206
U236
PROM
444-228
C41
U201
443-879
C1
585-62
DMA CONTROL, WAIT LOGIC, DECODE
CPU CARD
SHEET 3 OF 4


U212 S0
U212 S1
U212 S2
U212 LOCK
U209 HRQ
U225 443-864
IDLE
U225 443-864
U226 443-1051
U233 443-754
U221 443-1172
U235 443-728
U234 443-755
U227 443-1053
DRDYEN
B19 DACK0
A10 IOCHRDY
RP3 47K
RP5 2.2K
+5V
U240 BMEMR
U240 BIOR
U240 BIOW
U233 443-754
U224 443-1047
U224 443-1047
U226 443-1051
U225 443-837
U233 BRESET
U211 CLK88
U239 443-791
CLK
RP1 10 PIN SIP 330 Ω
CR1
CR2
CR3
CR4
CR5
CR6
CPU
ROM
RAM
INT
DSK
RDY
U244 BD0
BD1
BD2
BD3
BD4
BD5
U201 443-879
U220 BA5
BA6
BA7
U239 BA8
BA9
U205 443-877
N.C.
U204 443-875
U204 443-875
U204 443-875
AEN
OW
256X4 PROM
U239 BA12
U239 BA13
U219 BA14
A16 A15
A15 A16
A14 A17
A13 A18
A12 A19
U236 444-228
N.C.
U225 443-864
U226 443-1051
C38
U233 443-754
C25
U234 443-755
U226 443-1051
C35
U235 443-728
U221 443-1172
C23
U227 443-1053
C13
U204 443-875
ALL CAPACITORS SHOWN ARE 0.1 µF P/N 21-786 UNLESS OTHERWISE NOTED.
ALL RESISTORS SHOWN ARE 1/4 WATT 5% UNLESS OTHERWISE NOTED.

EXTRA GATES:

U234 443-755

U219 443-780

U224 443-1047

U203 443-1084

U221 443-1172

U233 443-754

U242 443-837

EXTRA RESISTORS:

RP1.1Ø	4.7KΩ
RP2.1Ø	4.7KΩ
RP3 .9.1Ø	4.7KΩ
RP5 .5	2.2KΩ

DRQ Ø → U209

IRQ Ø → U237

P1

R203 150Ω

8Ω

SPEAKER SP201

432-1231

KEYBOARD DATA AND POWER CONNECTOR

ENIOCK → U234

→ U210

+5V

R208 1KΩ

R205 4.7KΩ

L204 .01 100K

L203

C228 220pf

C229 220pf

U216 443-967

L206

C251 .01

U203 443-1084

U203 443-1084

L205

C252 .01

U216 443-967

U202 443-769

QH QG QF QE QD QC QB QA CLK CLR A B

KYBCLK

KYBDATA

KYBRST

KYBGND

KYBPWR

U203 443-1084

PB7

U203

PR U217 443-1051 CLR

IRQ1 → U237

Z-150 TIMER, KEYBOARD, SOUND, SWITCHES

U215 443-799

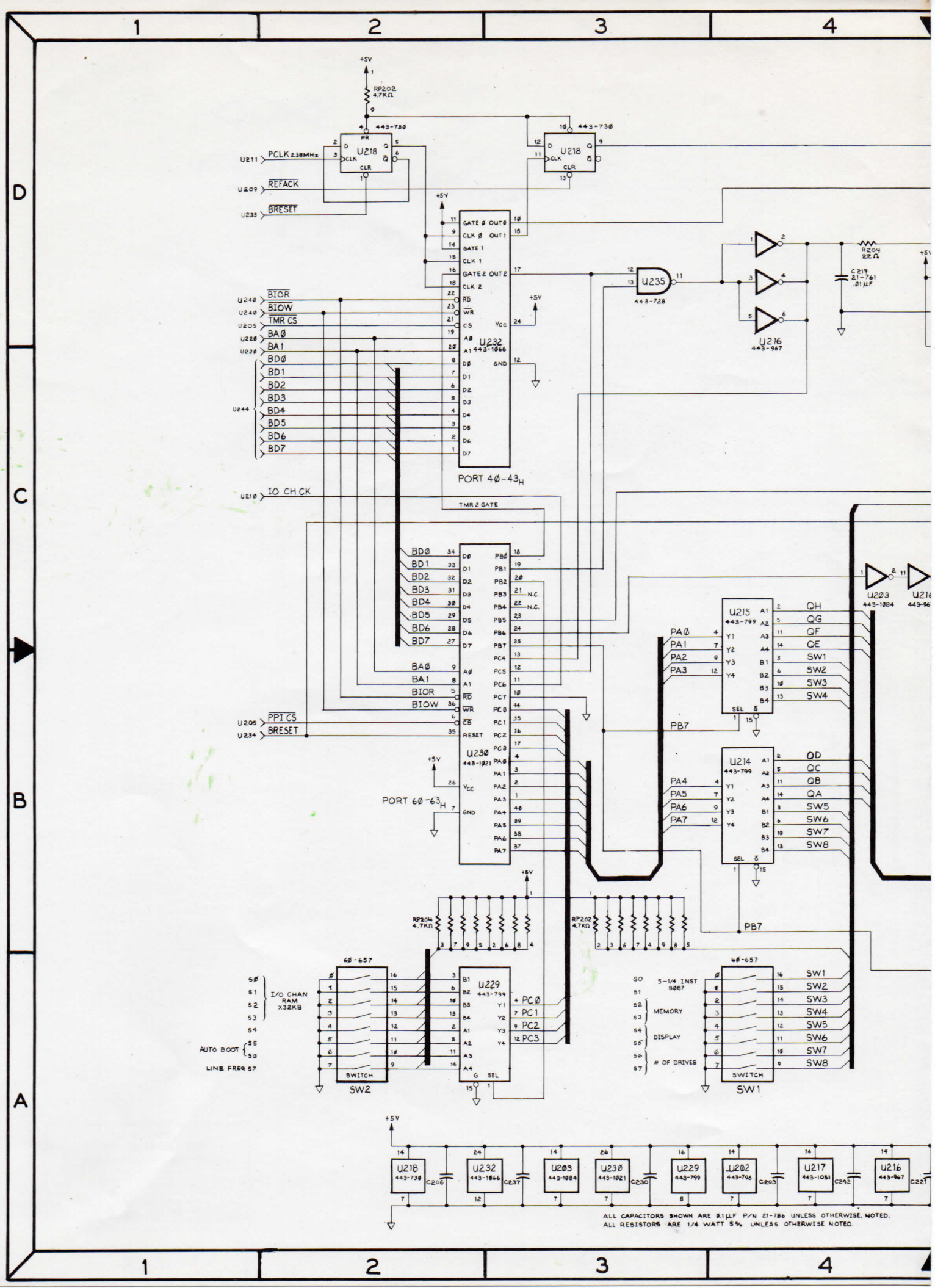
C228

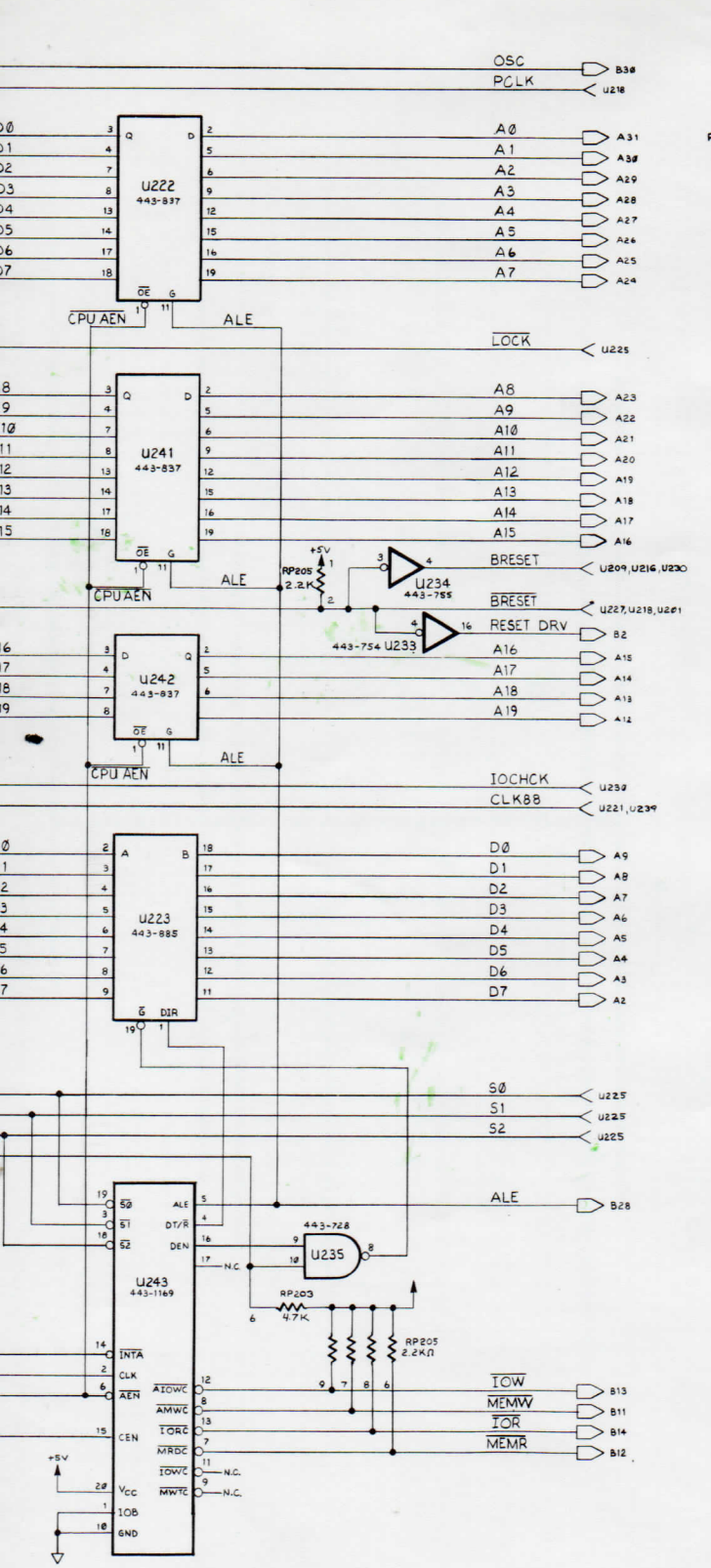
U214 443-799

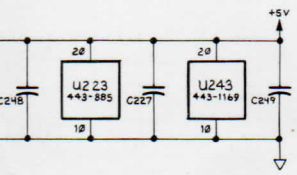
585-62
TIMER, KEY BOARD, SOUND AND SWITCHES CPU CARD

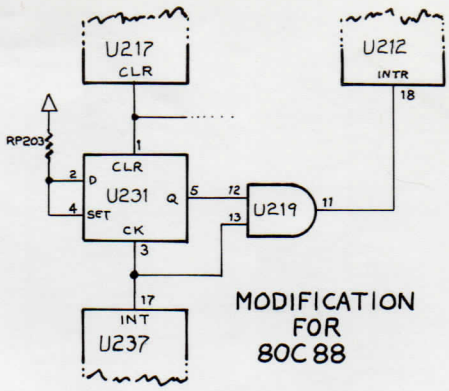
SHEET 4 OF 4

D C B A


1
2
3
4
D
C
B
A
+5V
RP202 4.7KΩ
U218 443-738
U211 PCLK 2.38MHz
U209 REFACK
U233 BRESET
U235 443-728
U216 443-967
R204 22Ω
C219 21-761 .01μF
U232 443-1066
PORT 40-43H
U248 BIOR
U240 BIOW
U205 TMR CS
U228 BA0
U228 BA1
U228 BD0
U244 BD1 BD2 BD3 BD4 BD5 BD6 BD7
U210 IO CH CK
TMR 2 GATE
U230 443-1021
PORT 60-63H
U205 PPI CS
U234 BRESET
U215 443-799
U214 443-799
U203 443-1084
PA0 PA1 PA2 PA3 PA4 PA5 PA6 PA7
PB7
QH QG QF QE QD QC QB QA
SW1 SW2 SW3 SW4 SW5 SW6 SW7 SW8
RP204 4.7KΩ
RP202 4.7KΩ
60-657
40-657
U229 443-799
I/O CHAN RAM X32KB
AUTO BOOT
LINE FREQ
5-1/4 INST 8087
MEMORY
DISPLAY
OF DRIVES
SWITCH
SW2
SW1
PC0 PC1 PC2 PC3
U218 443-738 C206
U232 443-1866 C237
U203 443-1084
U230 443-1021 C230
U229 443-799
U202 443-796 C203
U217 443-1031 C242
U216 443-967 C221
ALL CAPACITORS SHOWN ARE 0.1μF P/N 21-786 UNLESS OTHERWISE NOTED.
ALL RESISTORS ARE 1/4 WATT 5% UNLESS OTHERWISE NOTED.







MODIFICATION FOR 80C88

HEATH ZENITH

NOTES:

1. ALL RESISTOR VALUES ARE IN OHMS (k = 1,000, M = 1,000,000) ALL RESISTORS ARE 1/4-WATT, 5% UNLESS OTHERWISE SPECIFIED.
2. ALL CAPACITOR VALUES ARE IN μF (MICROFARADS), UNLESS OTHERWISE SPECIFIED.
3. REFER TO THE CIRCUIT BOARD COMPONENT VIEW FOR THE PHYSICAL LOCATION OF PARTS.

LEGEND:

1. CIRCUIT BOARD GROUND
2. +5 V
3. BUS SIGNAL
4. MECHANICAL CONNECTION
5. DIRECTION TO
6. DIRECTION FROM
7. NO CONNECTION
8. CONNECTION

PARTS ORDERING INFORMATION:

If you order a part from Zenith Data Systems, use the (HE) prefix. Example:

HE 443-730

If you order a part from Heath Company, DO NOT use the (HE) prefix. Example:

443-730

For semiconductor type numbers (Example: 74LS153), refer to the "Semiconductor Identification Chart."

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DMA CONTROLLER, ROMS AND BUS BUFFERS CPU CARD

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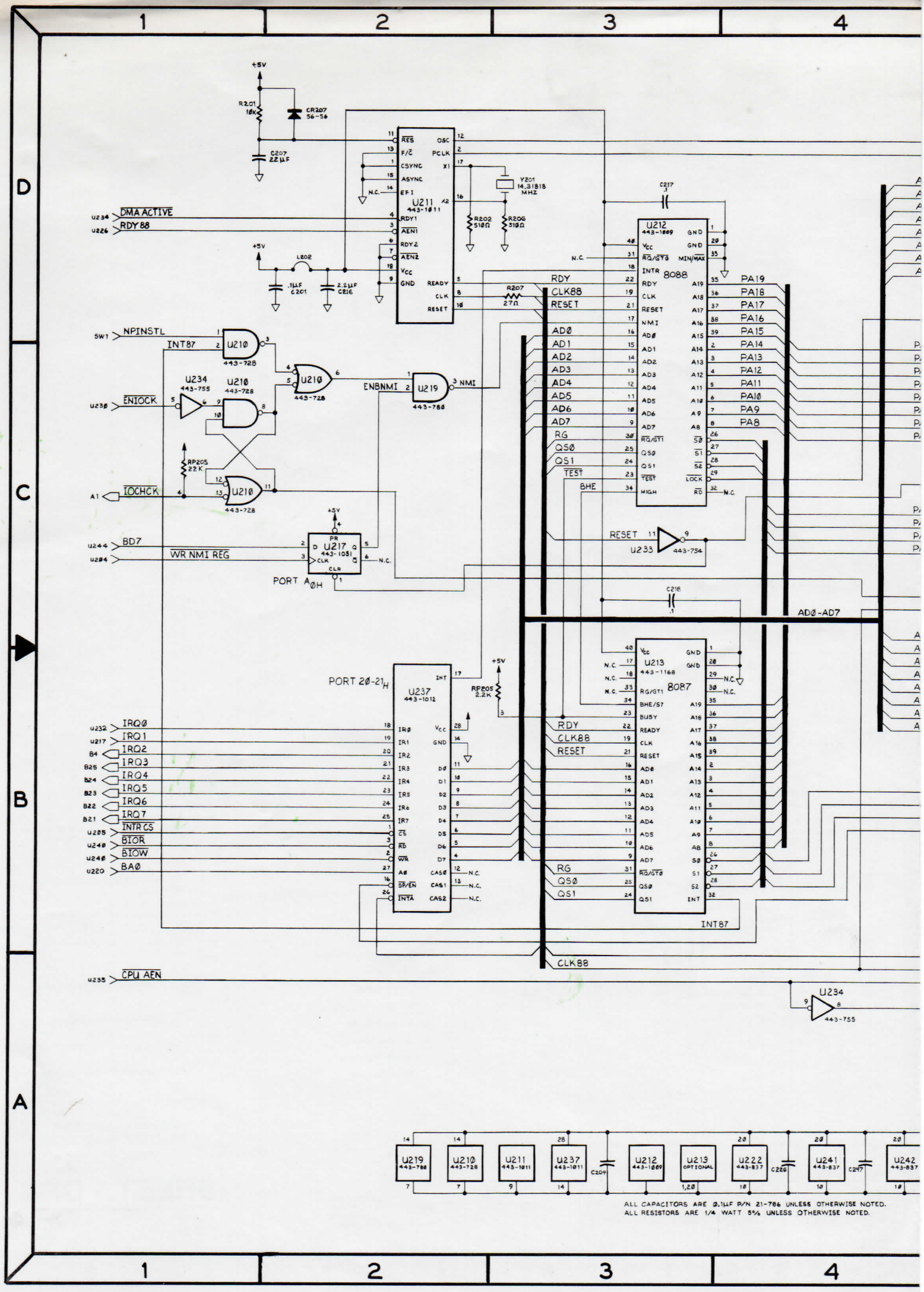
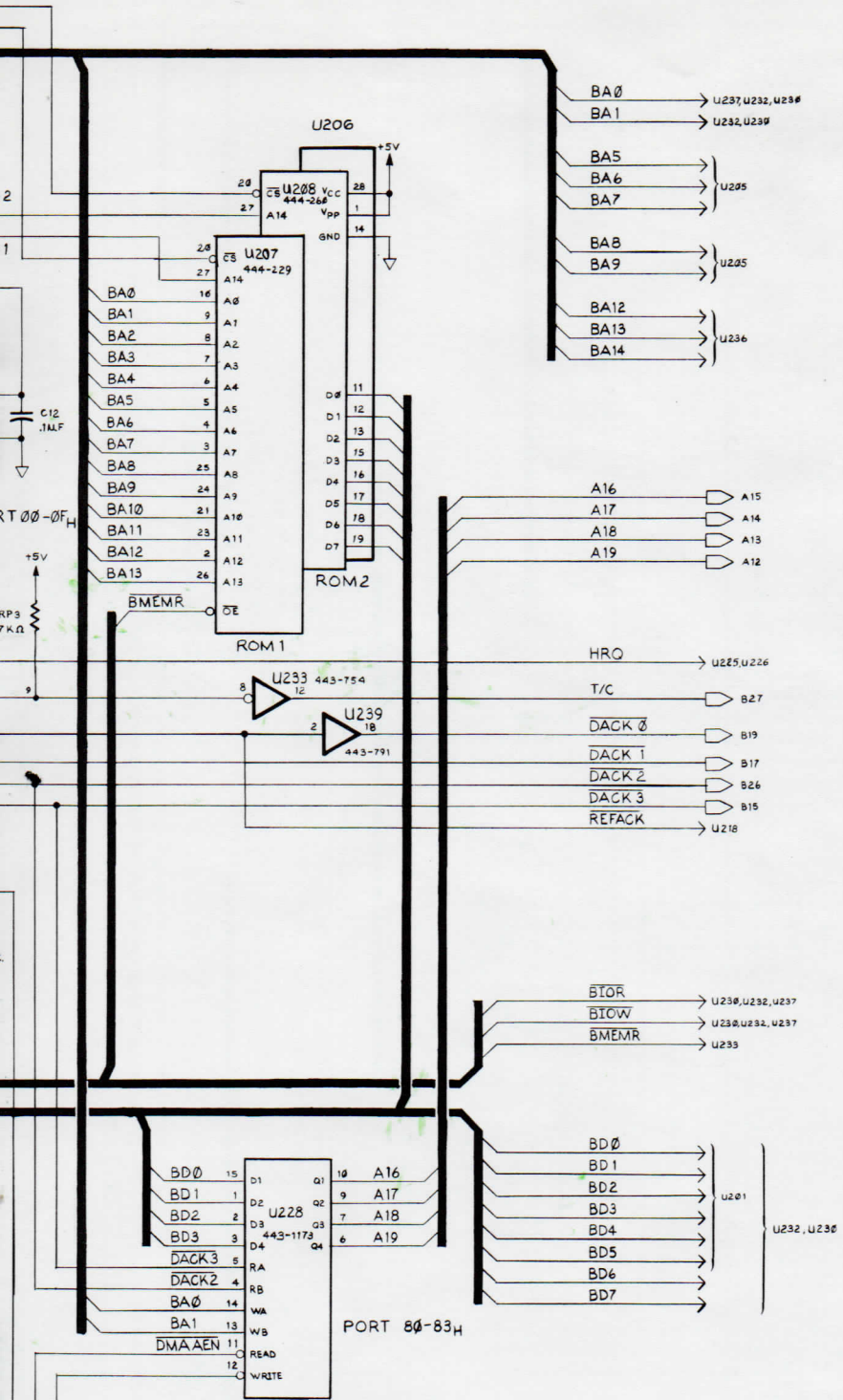
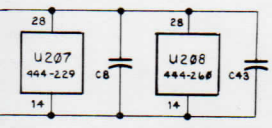


U211 443-1011
U212 443-1009
8088
U213 443-1168
8087
U237 443-1012
U217 443-1051
U234 443-755
U210 443-728
U219 443-780
U233 443-754
U234 443-755
DMA ACTIVE
RDY88
NPINSTL
INT87
ENIOCK
IOCHCK
BD7
WR NMI REG
PORT A0H
PORT 20-21H
IRQ0
IRQ1
IRQ2
IRQ3
IRQ4
IRQ5
IRQ6
IRQ7
INTR CS
BIOR
BIOW
BA0
CPU AEN
ENBNMI
NMI
RDY
CLK88
RESET
AD0
AD1
AD2
AD3
AD4
AD5
AD6
AD7
RG
QS0
QS1
TEST
BHE
PA19
PA18
PA17
PA16
PA15
PA14
PA13
PA12
PA11
PA10
PA9
PA8
AD0-AD7
INT87
CLK88
+5V
R201 10K
CR207 56-56
C207 22µF
Y201 14.31818 MHZ
R202 510Ω
R206 510Ω
R207 27Ω
L202
.1µF C201
2.2µF C216
C217 .1
C218 .1
RP205 22K
RP205 2.2K
ALL CAPACITORS ARE 0.1µF P/N 21-786 UNLESS OTHERWISE NOTED.
ALL RESISTORS ARE 1/4 WATT 5% UNLESS OTHERWISE NOTED.

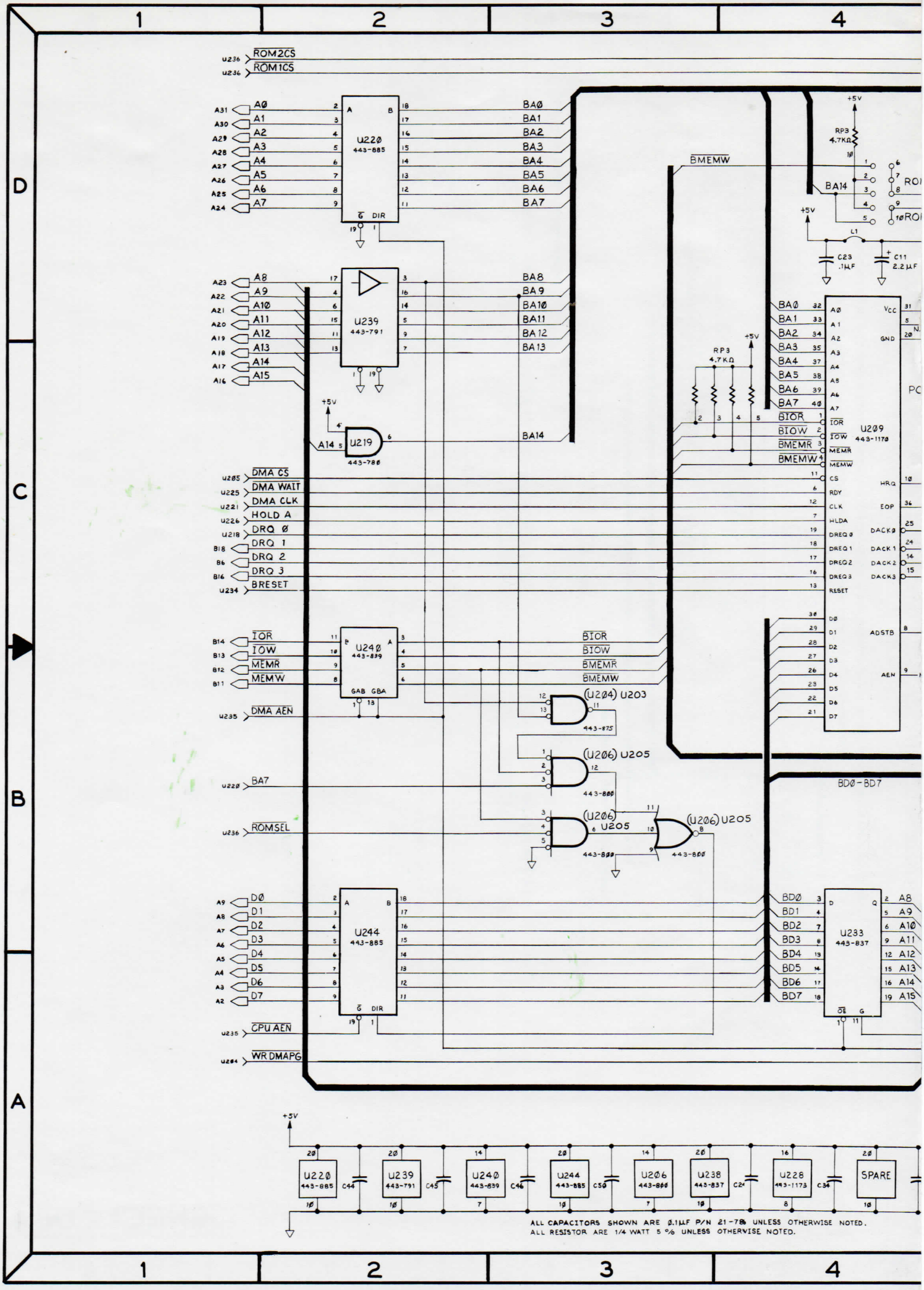


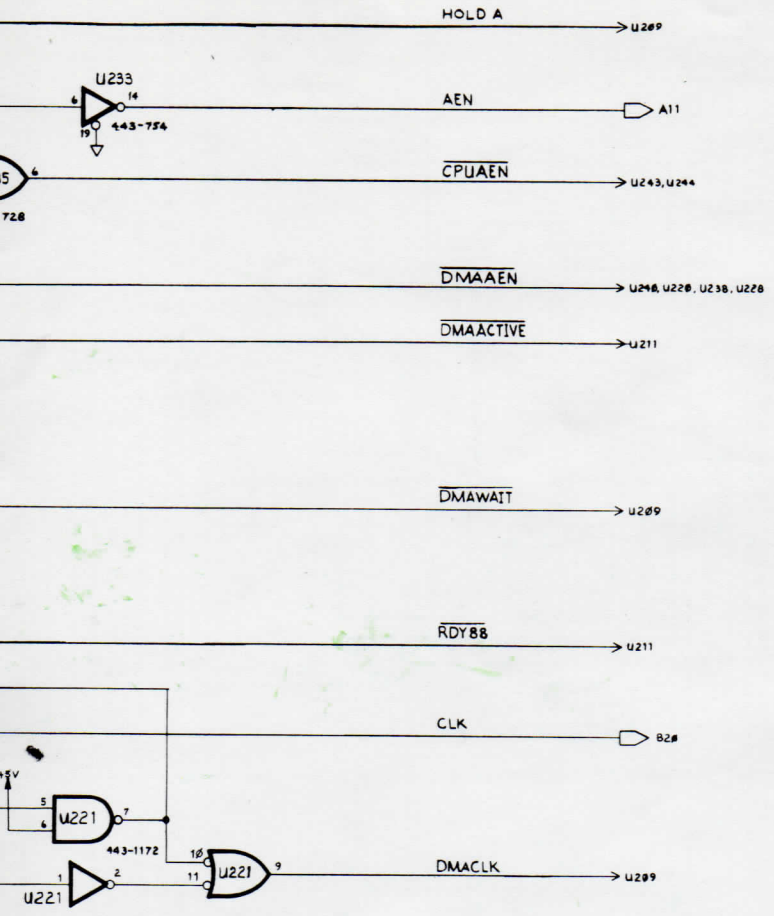
Z-150 DMA CONTROLLER
ROMS AND BUSS BUFFERS

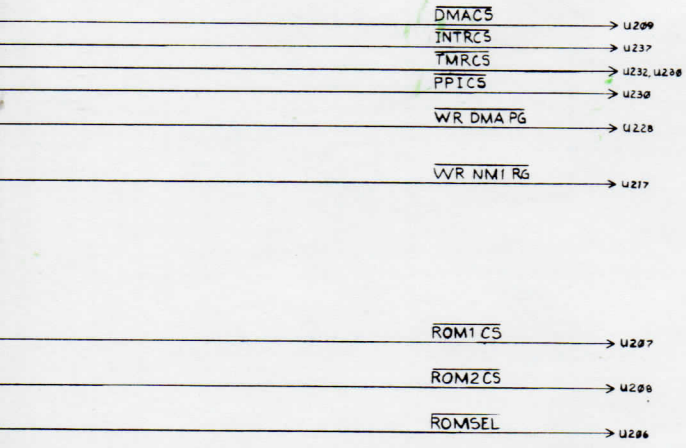


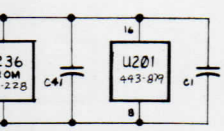
585-62-02
DMA CONTROL, WAIT LOGIC, DECODE
CPU CARD

SHEET 2 OF 4


1
2
3
4
D
C
B
A
U236 ROM2CS
U236 ROM1CS
A31 A0
A30 A1
A29 A2
A28 A3
A27 A4
A26 A5
A25 A6
A24 A7
U220 443-885
DIR
BA0
BA1
BA2
BA3
BA4
BA5
BA6
BA7
A23 A8
A22 A9
A21 A10
A20 A11
A19 A12
A18 A13
A17 A14
A16 A15
U239 443-791
BA8
BA9
BA10
BA11
BA12
BA13
+5V
A14
U219 443-786
BA14
BMEMW
RP3 4.7KΩ
BA14
+5V
L1
C23 .1μF
C11 2.2μF
U209 443-1170
BA0
BA1
BA2
BA3
BA4
BA5
BA6
BA7
BIOR
BIOW
BMEMR
BMEMW
U285 DMA CS
U225 DMA WAIT
U221 DMA CLK
U226 HOLD A
U218 DRQ 0
B18 DRQ 1
B6 DRQ 2
B16 DRQ 3
U234 BRESET
B14 IOR
B13 IOW
B12 MEMR
B11 MEMW
U240 443-839
GAB GBA
BIOR
BIOW
BMEMR
BMEMW
U235 DMA AEN
(U204) U203
443-875
(U206) U205
443-888
U228 BA7
U236 ROMSEL
(U206) U205
443-888
A9 D0
A8 D1
A7 D2
A6 D3
A5 D4
A4 D5
A3 D6
A2 D7
U244 443-885
DIR
BD0 BD1 BD2 BD3 BD4 BD5 BD6 BD7
U233 443-837
A8 A9 A10 A11 A12 A13 A14 A15
BD0-BD7
U235 CPU AEN
U284 WR DMAPG
+5V
U220 443-885 C44
U239 443-791 C45
U240 443-839 C46
U244 443-885 C50
U206 443-888
U238 443-837 C24
U228 443-1173 C34
SPARE
ALL CAPACITORS SHOWN ARE .1μF P/N 21-78 UNLESS OTHERWISE NOTED.
ALL RESISTOR ARE 1/4 WATT 5 % UNLESS OTHERVISE NOTED.

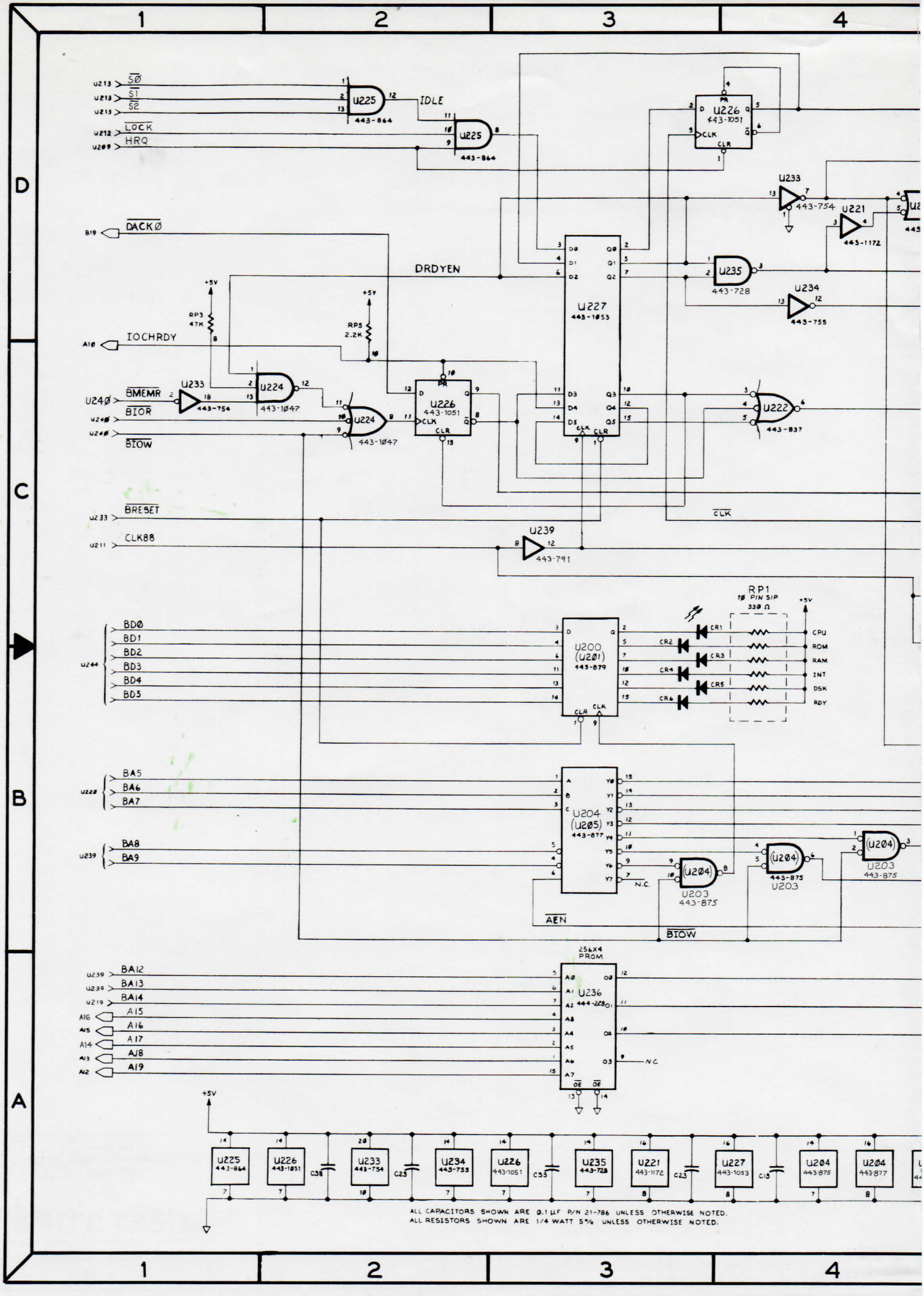


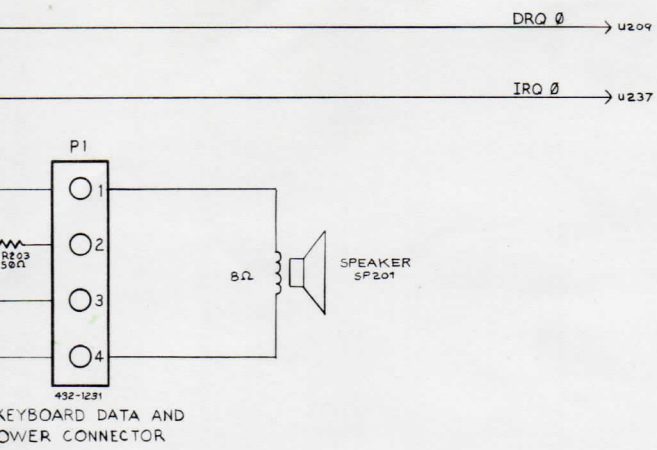




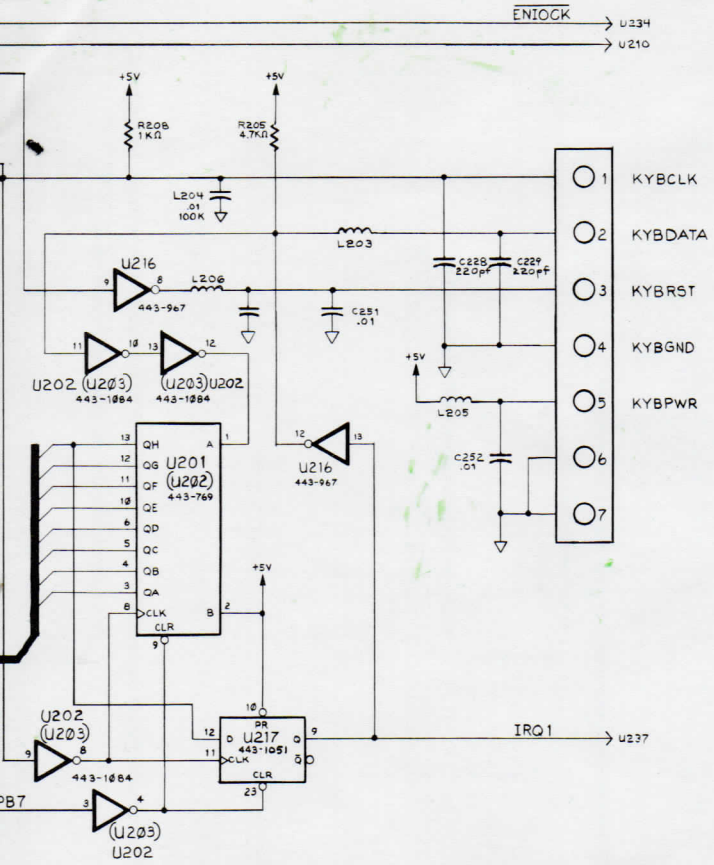
585-62-02
DMA CONTROL, WAIT LOGIC, DECODE
CPU CARD

SHEET 3 OF 4


1
2
3
4
D
C
B
A
U213 S0
U213 S1
U213 S2
U212 LOCK
U209 HRQ
U225
443-864
IDLE
U225
443-864
U226
443-1051
U233
443-754
U221
443-1172
B19 DACK0
DRDYEN
U227
443-1053
U235
443-728
U234
443-755
+5V
RP3
47K
RP5
2.2K
A10 IOCHRDY
U24Ø BMEMR
BIOR
BIOW
U233
443-754
U224
443-1047
U224
443-1047
U226
443-1051
U222
443-837
U233 BRESET
U211 CLK8B
CLK
U239
443-791
RP1
10 PIN SIP
330 Ω
BD0
BD1
BD2
BD3
BD4
BD5
U244
U200
(U201)
443-879
CR1
CR2
CR3
CR4
CR5
CR6
CPU
ROM
RAM
INT
DSK
RDY
BA5
BA6
BA7
U228
BA8
BA9
U239
U204
(U205)
443-877
N.C.
(U204)
U203
443-875
(U204)
443-875
U203
(U204)
U203
443-875
AEN
BIOW
256X4
PROM
U239 BA12
U239 BA13
U219 BA14
A16 A15
A15 A16
A14 A17
A13 A18
A12 A19
U236
444-2280-01
N.C.
+5V
U225
443-864
U226
443-1051
C38
U233
443-754
C25
U234
443-755
U226
443-1051
C33
U235
443-728
U221
443-1172
C23
U227
443-1053
C19
U204
443-875
U204
443-877
ALL CAPACITORS SHOWN ARE 0.1 µF P/N 21-786 UNLESS OTHERWISE NOTED.
ALL RESISTORS SHOWN ARE 1/4 WATT 5% UNLESS OTHERWISE NOTED.



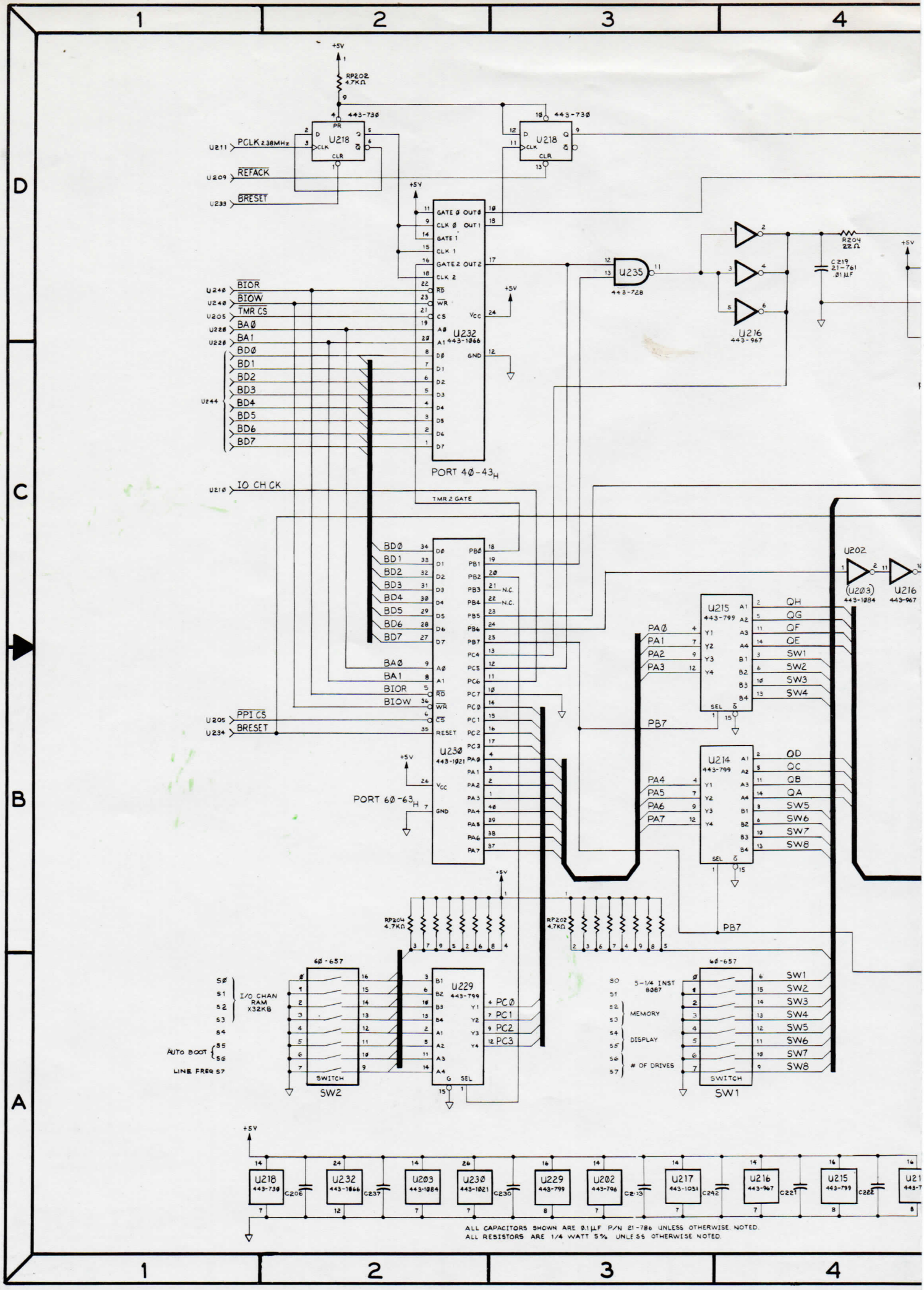
KEYBOARD DATA AND
POWER CONNECTOR

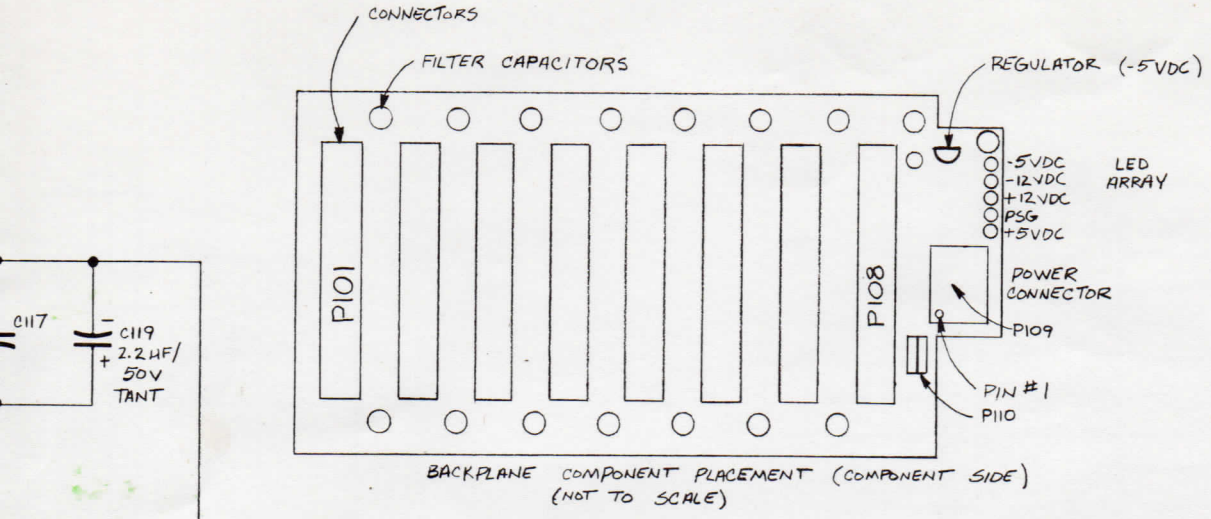


Z-150 TIMER, KEYBOARD,
SOUND, SWITCHES

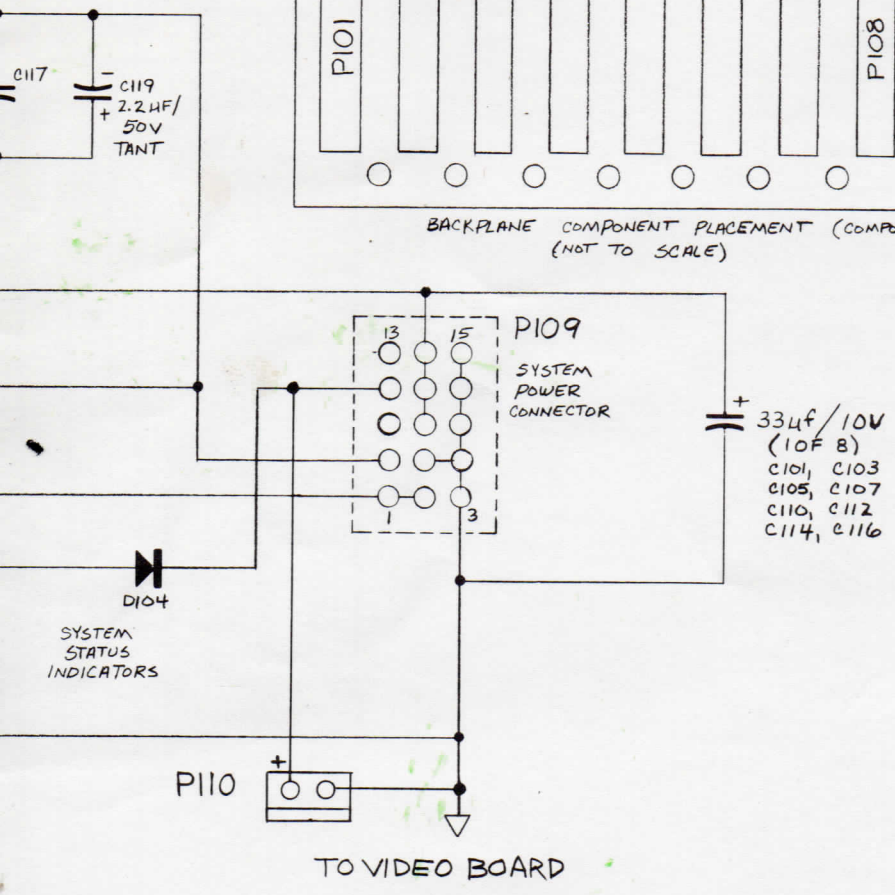
585-62-02
TIMER, KEY BOARD, SOUND
AND SWITCHES CPU CARD

SHEET 4 OF 4


+5V
RP202 4.7KΩ
U218 443-730
U211 PCLK 2.38MHz
U209 REFACK
U233 BRESET
U235 443-728
U216 443-967
R204 22Ω
C219 21-761 .01μF
U232 443-1066
PORT 40-43H
U244
BIOR
BIOW
TMR CS
BA0
BA1
BD0
BD1
BD2
BD3
BD4
BD5
BD6
BD7
U210 IO CH CK
TMR 2 GATE
U230 443-1021
PORT 60-63H
PPI CS
BRESET
U202
(U203) 443-1084
U215 443-799
U214 443-799
PA0
PA1
PA2
PA3
PA4
PA5
PA6
PA7
PB7
QH
QG
QF
QE
QD
QC
QB
QA
SW1
SW2
SW3
SW4
SW5
SW6
SW7
SW8
RP204 4.7KΩ
RP202 4.7KΩ
U229 443-799
PC0
PC1
PC2
PC3
60-657
I/O CHAN RAM X32KB
AUTO BOOT
LINE FREQ S7
5-1/4 INST 8087
MEMORY
DISPLAY
OF DRIVES
SWITCH
U218 443-730
U232 443-1066
U203 443-1084
U230 443-1021
U229 443-799
U202 443-796
U217 443-1051
U216 443-967
U215 443-799
C206
C237
C230
C221
C222
ALL CAPACITORS SHOWN ARE 0.1μF P/N 21-786 UNLESS OTHERWISE NOTED.
ALL RESISTORS ARE 1/4 WATT 5% UNLESS OTHERWISE NOTED.



BACKPLANE COMPONENT PLACEMENT (COMPONENT SIDE)
(NOT TO SCALE)



HEATH ZENITH

NOTES:

1. ALL RESISTOR VALUES ARE IN OHMS (k = 1,000, M = 1,000,000) ALL RESISTORS ARE 1/4-WATT, 5% UNLESS OTHERWISE SPECIFIED.
2. ALL CAPACITOR VALUES ARE IN µF (MICROFARADS), UNLESS OTHERWISE SPECIFIED.
3. REFER TO THE CIRCUIT BOARD COMPONENT VIEW FOR THE PHYSICAL LOCATION OF PARTS.

LEGEND:

1. CIRCUIT BOARD GROUND
2. +5 V
3. BUS SIGNAL
4. MECHANICAL CONNECTION
5. DIRECTION TO
6. DIRECTION FROM
7. NO CONNECTION
8. CONNECTION

PARTS ORDERING INFORMATION:

If you order a part from Zenith Data Systems, use the (HE) prefix. Example:

HE 443-730

If you order a part from Heath Company, DO NOT use the (HE) prefix. Example:

443-730

For semiconductor type numbers (Example: 74LS153), refer to the "Semiconductor Identification Chart."

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BACKPLANE BOARD

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BACKPLANE BOARD

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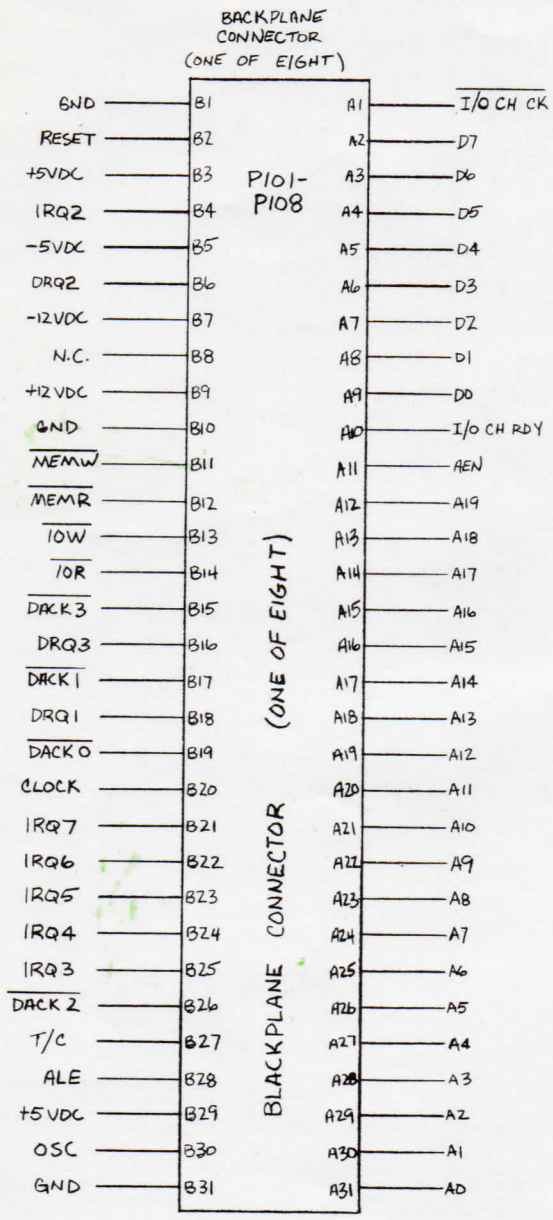
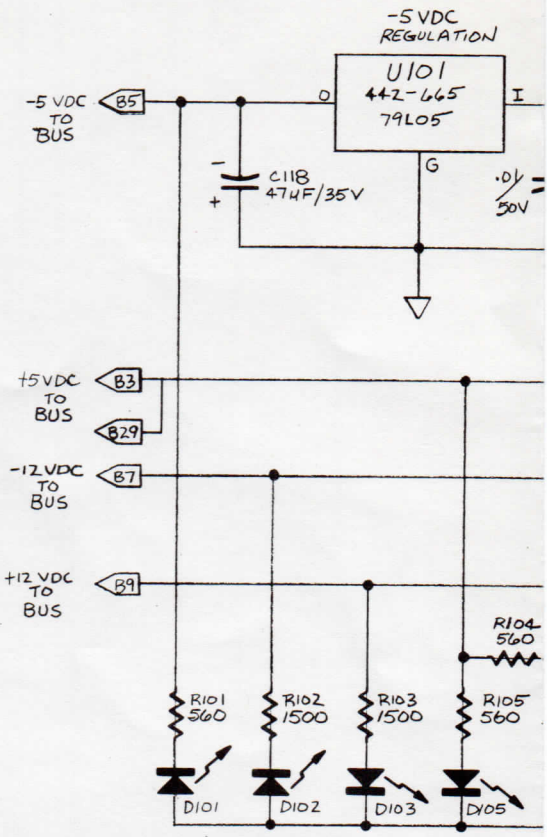
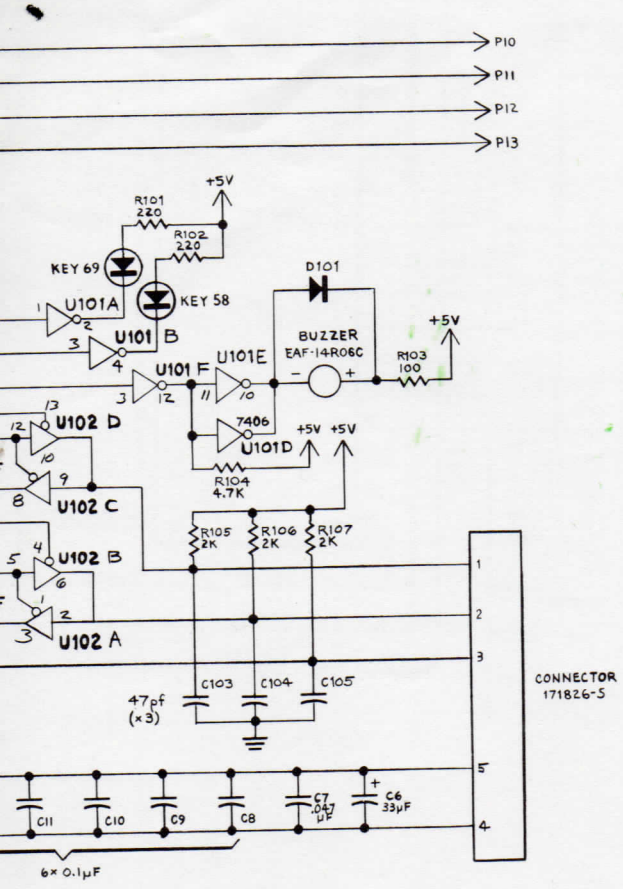

BACKPLANE CONNECTOR (ONE OF EIGHT)
P101-P108
BLACKPLANE CONNECTOR (ONE OF EIGHT)
GND B1
RESET B2
+5VDC B3
IRQ2 B4
-5VDC B5
DRQ2 B6
-12VDC B7
N.C. B8
+12VDC B9
GND B10
MEMW B11
MEMR B12
IOW B13
IOR B14
DACK3 B15
DRQ3 B16
DACK1 B17
DRQ1 B18
DACK0 B19
CLOCK B20
IRQ7 B21
IRQ6 B22
IRQ5 B23
IRQ4 B24
IRQ3 B25
DACK2 B26
T/C B27
ALE B28
+5VDC B29
OSC B30
GND B31
A1 I/O CH CK
A2 D7
A3 D6
A4 D5
A5 D4
A6 D3
A7 D2
A8 D1
A9 D0
A10 I/O CH RDY
A11 AEN
A12 A19
A13 A18
A14 A17
A15 A16
A16 A15
A17 A14
A18 A13
A19 A12
A20 A11
A21 A10
A22 A9
A23 A8
A24 A7
A25 A6
A26 A5
A27 A4
A28 A3
A29 A2
A30 A1
A31 A0


-5 VDC REGULATION
U101
442-665
79L05
O
I
G
-5 VDC TO BUS
B5
C118
47uF/35V
.01
50V
+5VDC TO BUS
B3
B29
-12VDC TO BUS
B7
+12 VDC TO BUS
B9
R104
560
R101
560
R102
1500
R103
1500
R105
560
D101
D102
D103
D105



HEATH ZENITH

NOTES:

1. ALL RESISTOR VALUES ARE IN OHMS (k = 1,000, M = 1,000,000) ALL RESISTORS ARE 1/4-WATT, 5% UNLESS OTHERWISE SPECIFIED.
2. ALL CAPACITOR VALUES ARE IN µF (MICROFARADS), UNLESS OTHERWISE SPECIFIED.
3. REFER TO THE CIRCUIT BOARD COMPONENT VIEW FOR THE PHYSICAL LOCATION OF PARTS.

LEGEND:

1. CIRCUIT BOARD GROUND
2. +5 V
3. BUS SIGNAL
4. MECHANICAL CONNECTION
5. DIRECTION TO
6. DIRECTION FROM
7. NO CONNECTION
8. CONNECTION

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443-730

For semiconductor type numbers (Example: 74LS153), refer to the "Semiconductor Identification Chart."

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Sheet 1 of 1
KEY BOARD

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KEY BOARD

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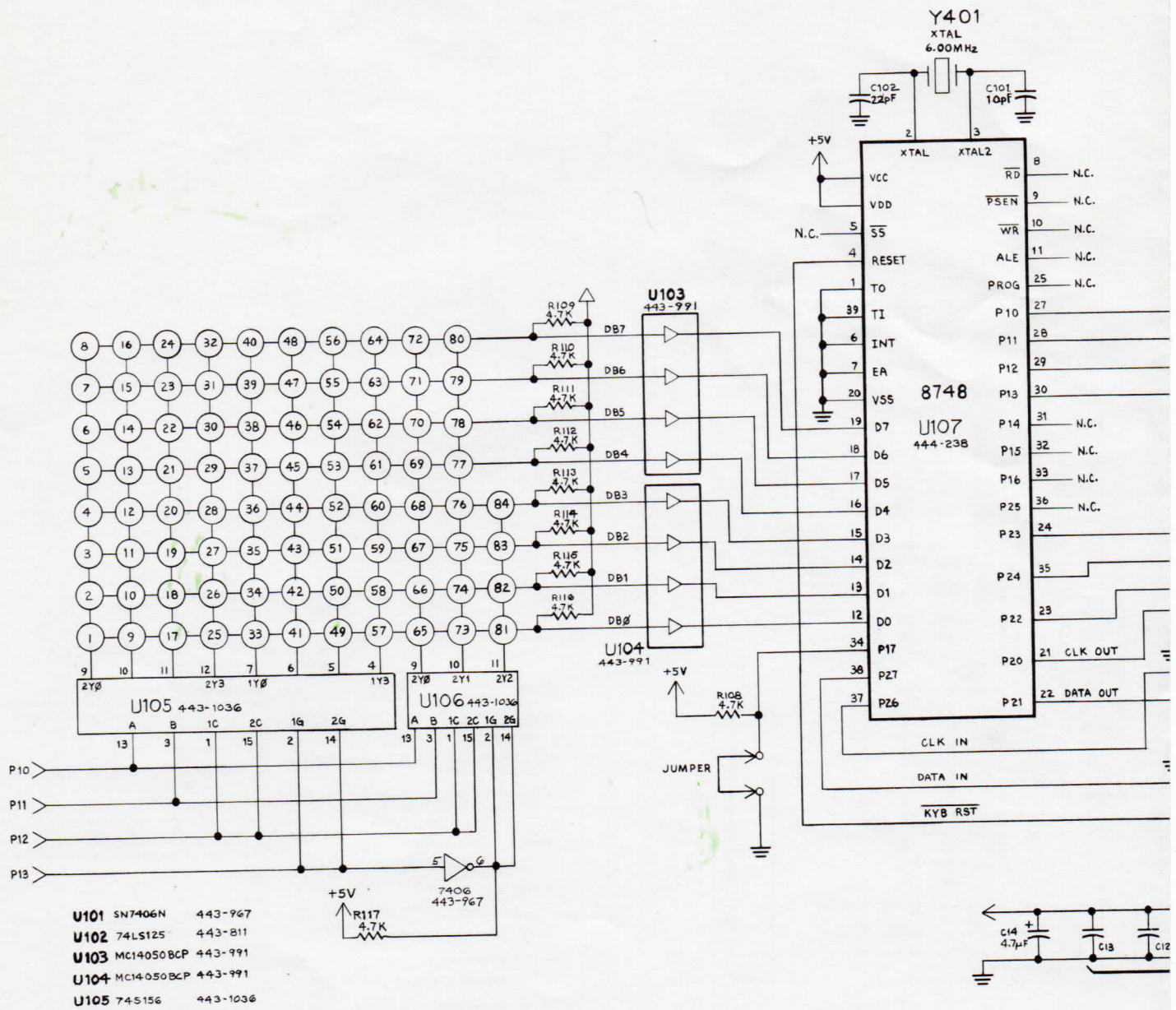
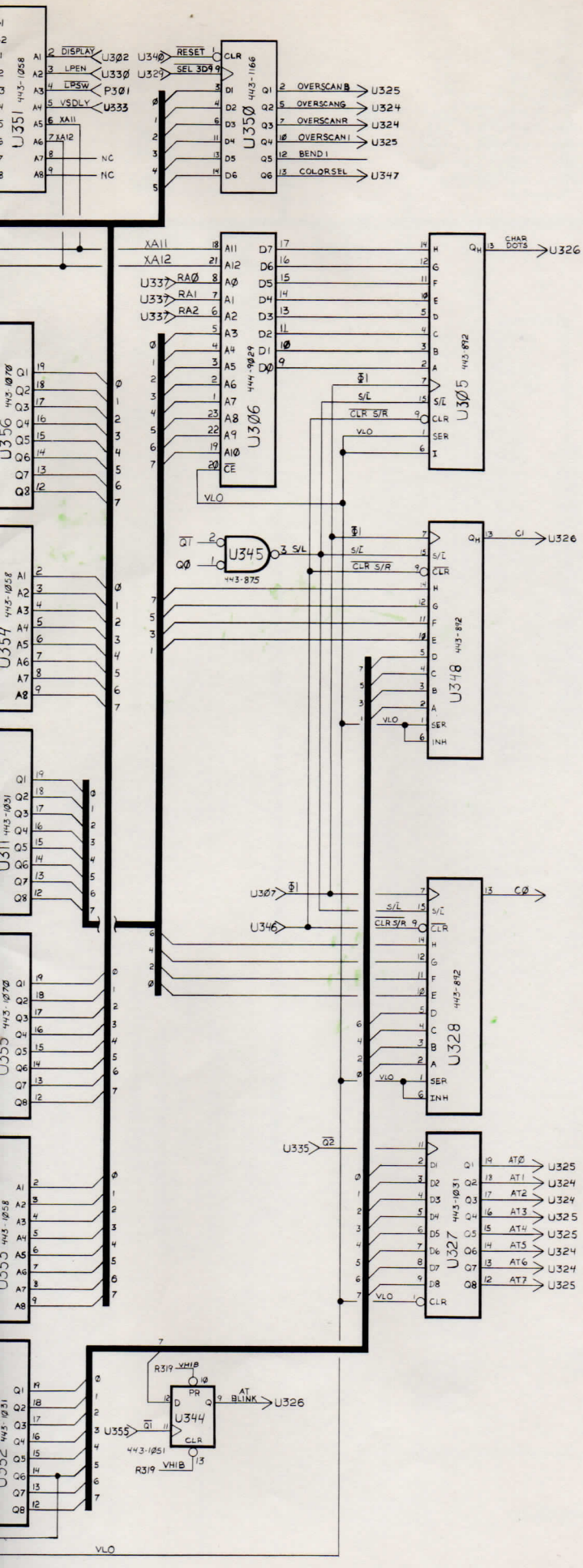


U101	SN7406N	443-967
U102	74LS125	443-811
U103	MC14050BCP	443-991
U104	MC14050BCP	443-991
U105	74S156	443-1036
U106	74S156	443-1036
U107	8748	444-238



HEATH ZENITH

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2. +5 V
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4. MECHANICAL CONNECTION
5. DIRECTION TO
6. DIRECTION FROM
7. NO CONNECTION
8. CONNECTION

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443-730

For semiconductor type numbers (Example: 74LS153), refer to the "Semiconductor Identification Chart."

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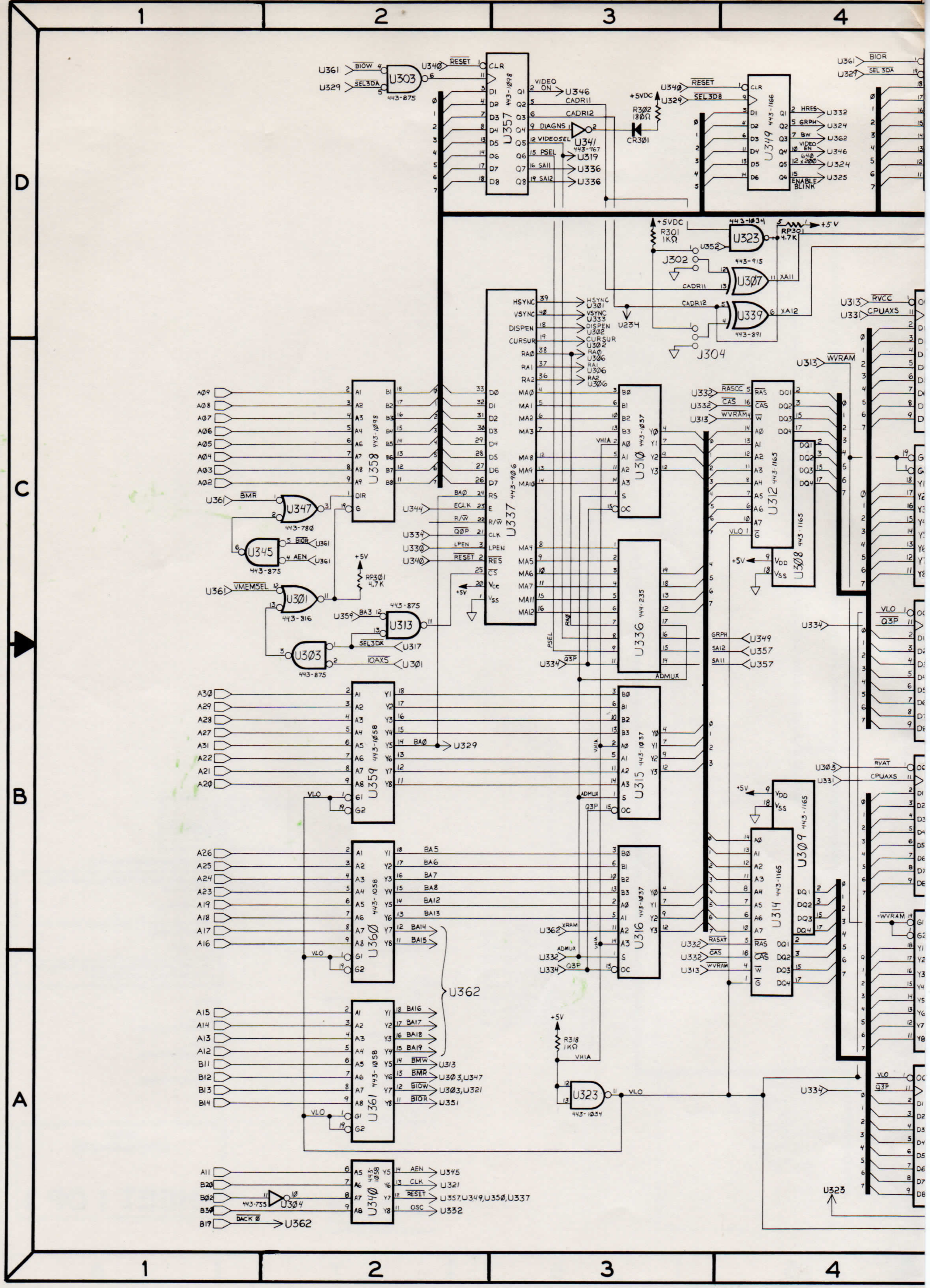

1
2
3
4
D
C
B
A
U303
443-875
U357
443-1098
VIDEO ON
U346
CADR11
CADR12
DIAGNS
U341
443-967
VIDEOSEL
PSEL
U319
SA11
SA12
U336
RESET
BIOW
SEL3DA
U361
U329
U340
+5VDC
R302
180Ω
CR301
SEL3D8
U349
443-1166
HRES
GRPH
BW
VIDEO EN
640 x 200
ENABLE BLINK
U332
U324
U362
U346
U325
BIOR
SEL 3DA
U323
443-1034
443-915
RP301
4.7K
+5V
R301
1KΩ
U352
J302
U307
XA11
U339
443-891
XA12
J304
U234
RVCC
CPUAXS
U313
U331
WVRAM
U358
443-1098
U337
443-906
HSYNC
VSYNC
DISPEN
CURSUR
RA0
RA1
RA2
U301
U333
U302
U306
MA0
MA1
MA2
MA3
MA8
MA9
MA10
MA4
MA5
MA6
MA7
MA11
MA12
BA0
ECLK
R/W
Q0P
LPEN
RESET
CS
VCC
VSS
U344
U334
U330
U310
443-1037
VHIA
U336
444-235
GRPH
U349
U357
ADMUX
U312
443-1165
RASCC
CAS
U308
443-1165
VLO
Q3P
BMR
U347
443-780
U345
443-875
BIOR
AEN
VMEMSEL
U301
443-316
RP301
4.7K
BA3
U359
U313
SEL3DX
U317
U303
443-875
IOAXS
A09
A08
A07
A06
A05
A04
A03
A02
A30
A29
A28
A27
A31
A22
A21
A20
U359
443-1058
U329
U315
443-1037
U309
443-1165
A26
A25
A24
A23
A19
A18
A17
A16
U360
443-1058
BA5
BA6
BA7
BA8
BA12
BA13
BA14
BA15
U316
443-1037
U362
XRAM
U314
443-1165
RASAT
RVAT
U303
A15
A14
A13
A12
B11
B12
B13
B14
U361
443-1058
BA16
BA17
BA18
BA19
BMW
BMR
BIOW
BIOR
U313
U303,U347
U303,U321
U351
R318
1KΩ
U323
443-1034
A11
B20
B02
B30
B19
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443-1058
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CLK
RESET
OSC
U345
U321
U357,U349,U350,U337
U332
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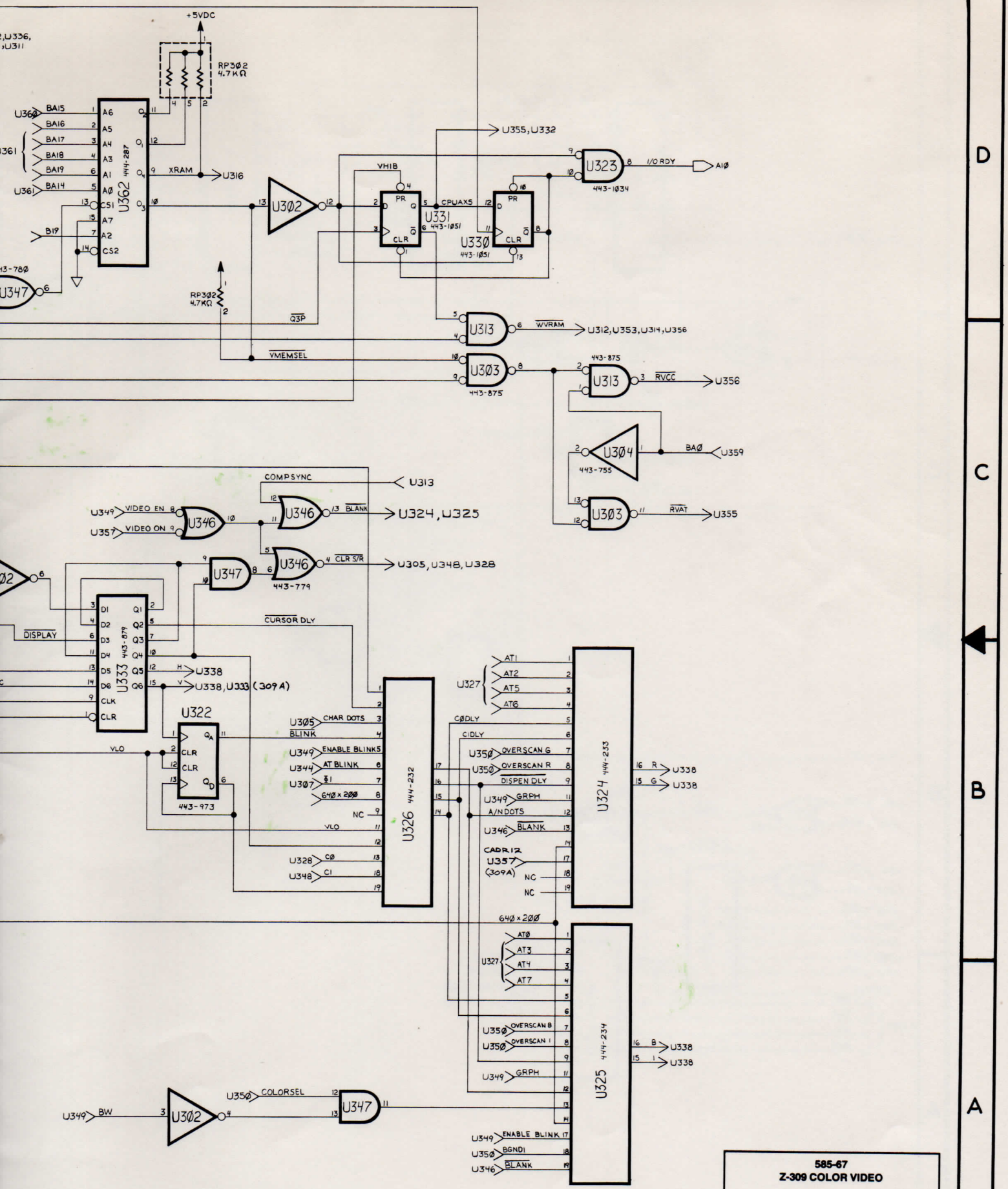

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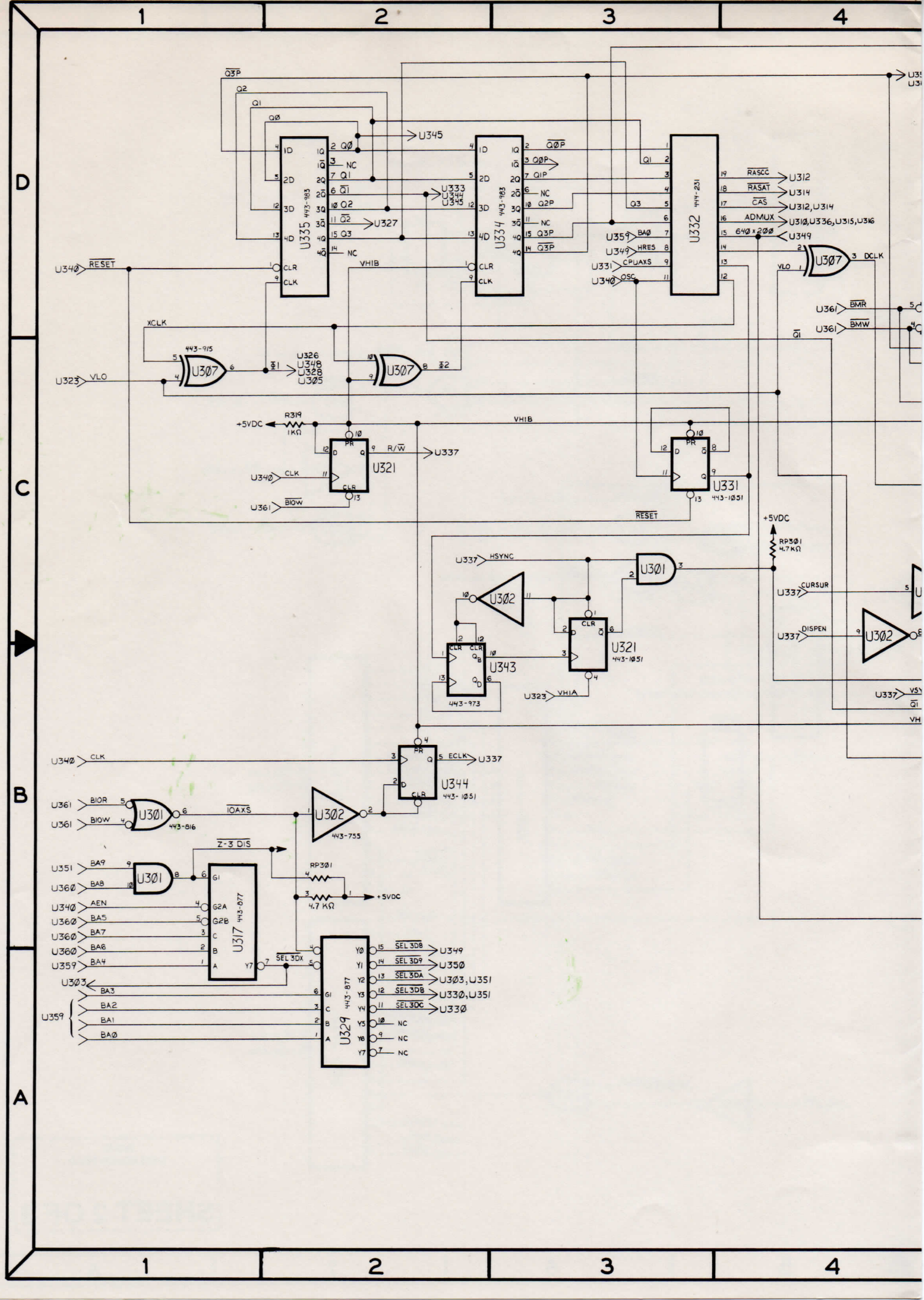
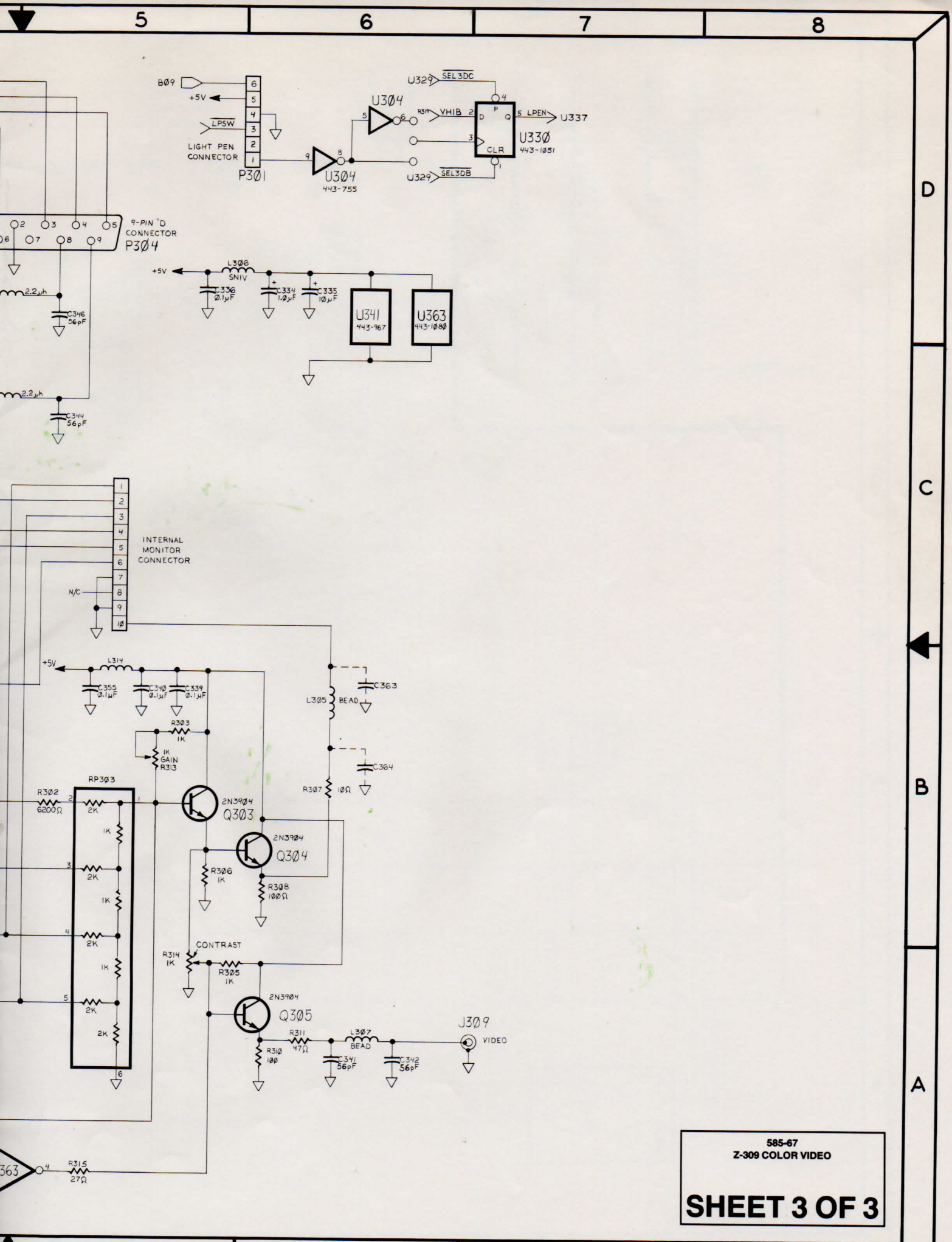
Z-309 COLOR VIDEO

SHEET 2 OF 3



U335 443-983
U334 443-983
U332 444-231
U307 443-915
U321
U331 443-1051
U343 443-973
U301 443-816
U302 443-755
U344 443-1051
U317 443-877
U329 443-877
R319 1KΩ
RP301 4.7KΩ
+5VDC
XCLK
VLO
VHIB
VHIA
RESET
HSYNC
CURSUR
DISPEN
DCLK
ECLK
IOAXS
Z-3 DIS
SEL 3DX
RASCC
RASAT
CAS
ADMUX
640x200
CPUAXS
HRES
OSC
BMR
BMW
BIOR
BIOW
AEN
BA0
BA1
BA2
BA3
BA4
BA5
BA6
BA7
BA8
BA9


5
6
7
8
D
C
B
A
B09
+5V
LPSW
LIGHT PEN CONNECTOR
P301
U304
443-755
U329 SEL3DC
U329 SEL3DB
VHIB
LPEN
U337
U330
443-1051
CLR
9-PIN "D" CONNECTOR
P304
L306
SNIV
C336 0.1µF
C334 1.0µF
C335 10µF
U341
443-967
U363
443-1080
2.2µh
C346 56pF
C344 56pF
INTERNAL MONITOR CONNECTOR
N/C
L314
C355 0.1µF
C340 0.1µF
C339 0.1µF
L305 BEAD
C363
C364
R303 1K
1K GAIN R313
R307 10Ω
RP303
R302 6200Ω
2K
1K
2N3904 Q303
2N3904 Q304
R306 1K
R308 100Ω
CONTRAST
R314 1K
R305 1K
2N3904 Q305
R311 47Ω
R310 100
L307 BEAD
C341 56pF
C342 56pF
J309
VIDEO
R315 27Ω
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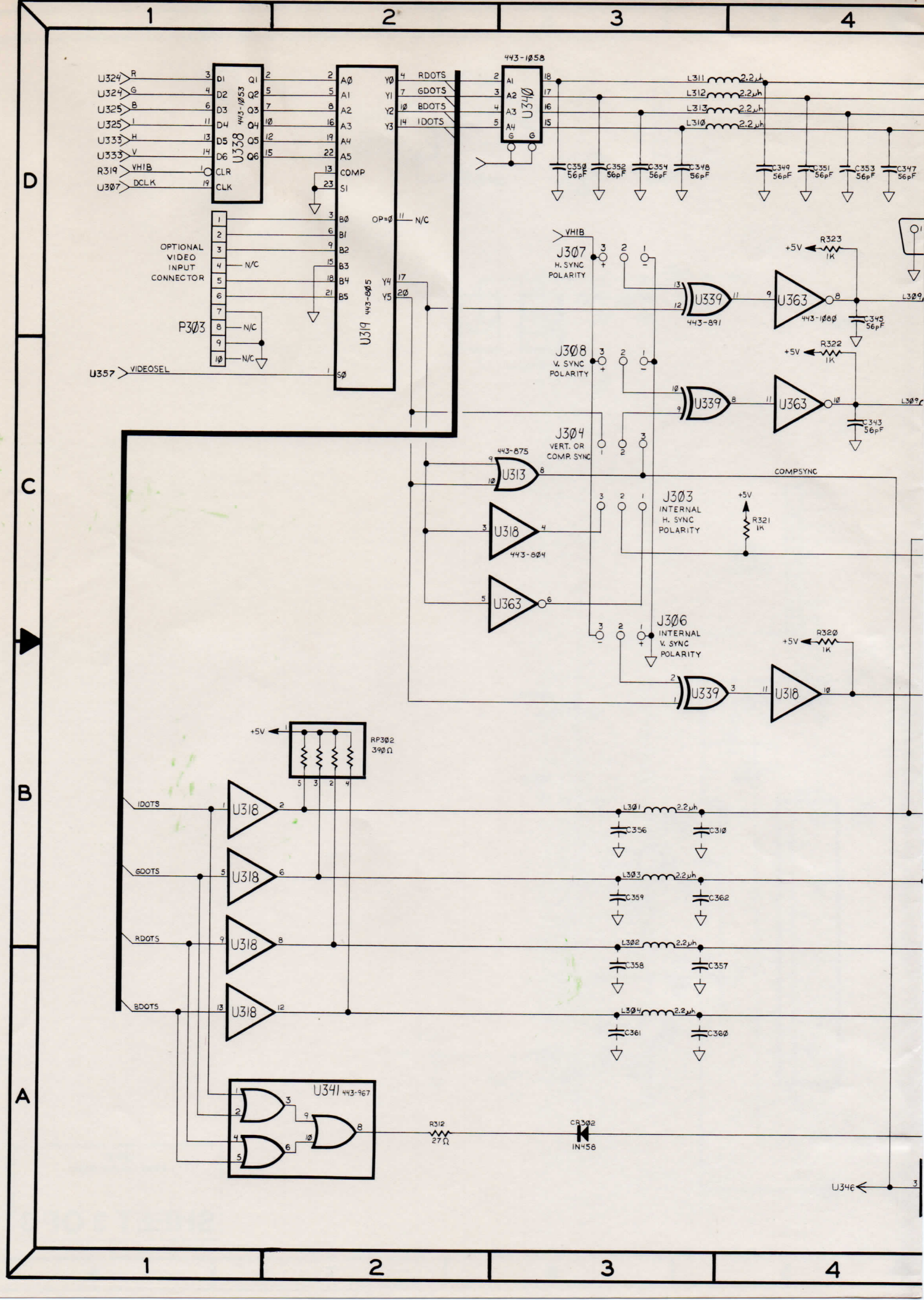
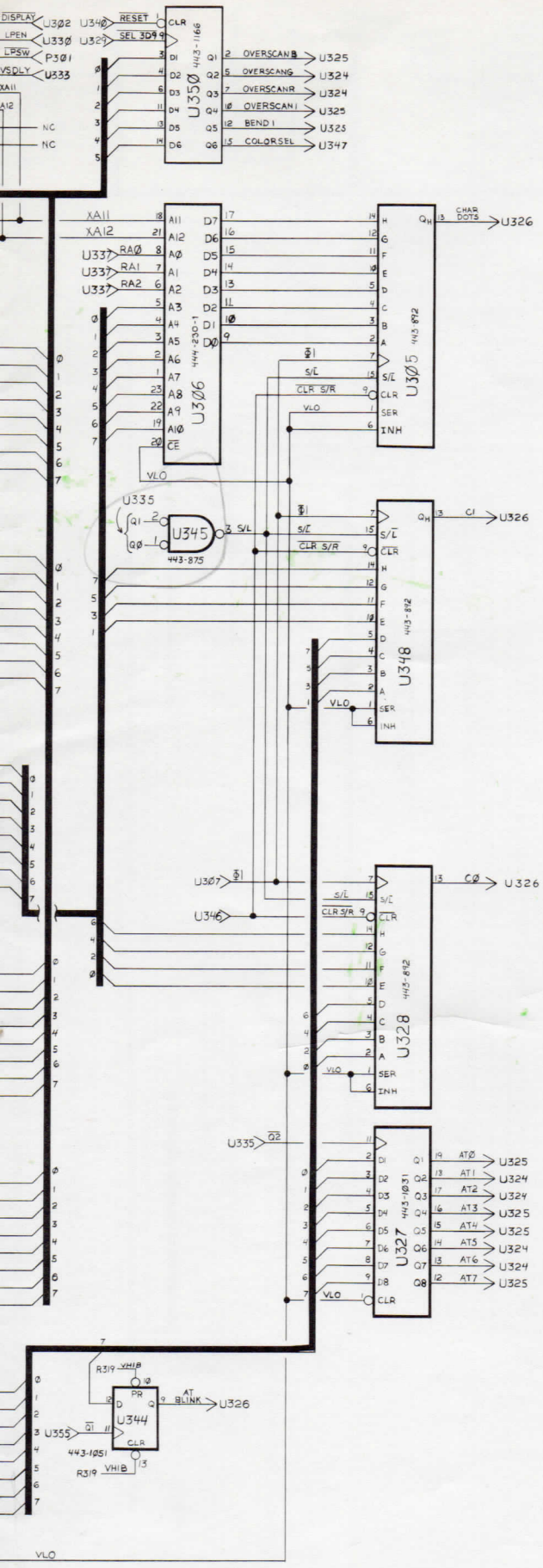
SHEET 3 OF 3


1
2
3
4
D
C
B
A
U324 R
U324 G
U325 B
U325 I
U333 H
U333 V
R319 VHIB
U307 DCLK
U338 443-1053
D1 D2 D3 D4 D5 D6 CLR CLK
Q1 Q2 Q3 Q4 Q5 Q6
A0 A1 A2 A3 A4 A5 COMP SI
Y0 Y1 Y2 Y3
RDOTS
GDOTS
BDOTS
IDOTS
443-1058
U340
A1 A2 A3 A4 G G
L311 2.2µh
L312 2.2µh
L313 2.2µh
L310 2.2µh
C350 56pF
C352 56pF
C354 56pF
C348 56pF
C349 56pF
C351 56pF
C353 56pF
C347 56pF
OPTIONAL VIDEO INPUT CONNECTOR
P303
N/C
U357 VIDEOSEL
U319 443-805
B0 B1 B2 B3 B4 B5 SO
OP=0
VHIB
J307 H. SYNC POLARITY
J308 V. SYNC POLARITY
J304 VERT. OR COMP. SYNC
J303 INTERNAL H. SYNC POLARITY
J306 INTERNAL V. SYNC POLARITY
U339
443-891
U363
443-1080
U313
443-875
U318
443-804
R323 1K
R322 1K
R321 1K
R320 1K
+5V
C345 56pF
C343 56pF
COMPSYNC
RP302 390Ω
L301 2.2µh
L303 2.2µh
L302 2.2µh
L304 2.2µh
C356
C310
C359
C362
C358
C357
C361
C380
U341 443-967
R312 27Ω
CR302 IN458
U346



HEATH ZENITH

NOTES:

1. ALL RESISTOR VALUES ARE IN OHMS (k = 1,000, M = 1,000,000) ALL RESISTORS ARE 1/4-WATT, 5% UNLESS OTHERWISE SPECIFIED.
2. ALL CAPACITOR VALUES ARE IN μF (MICROFARADS), UNLESS OTHERWISE SPECIFIED.
3. REFER TO THE CIRCUIT BOARD COMPONENT VIEW FOR THE PHYSICAL LOCATION OF PARTS.

LEGEND:

1. CIRCUIT BOARD GROUND
2. +5 V
3. BUS SIGNAL
4. MECHANICAL CONNECTION
5. DIRECTION TO
6. DIRECTION FROM
7. NO CONNECTION
8. CONNECTION

PARTS ORDERING INFORMATION:

If you order a part from Zenith Data Systems, use the (HE) prefix. Example:

HE 443-730

If you order a part from Heath Company, DO NOT use the (HE) prefix. Example:

443-730

For semiconductor type numbers (Example: 74LS153), refer to the "Semiconductor Identification Chart."

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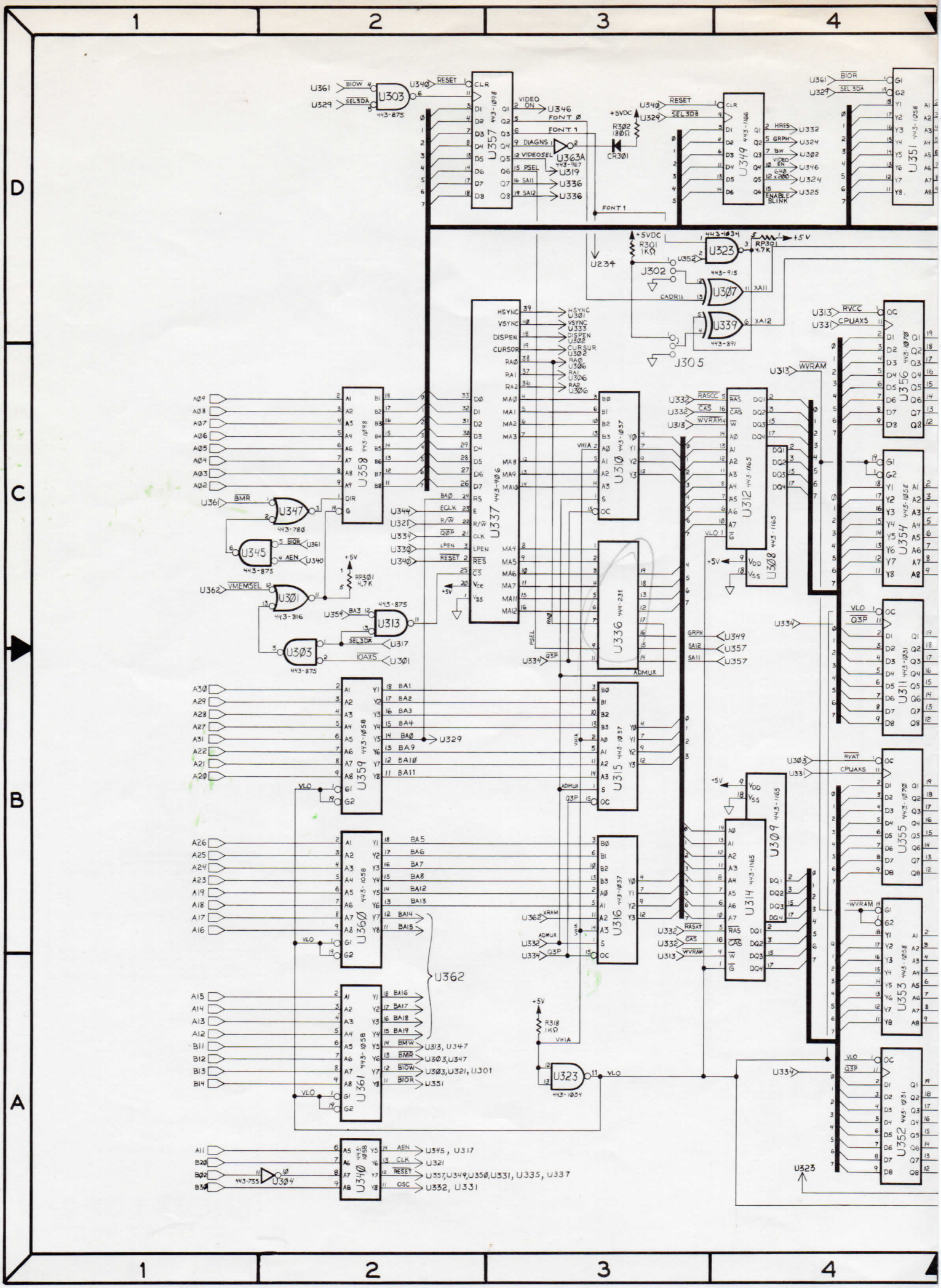

1
2
3
4
D
C
B
A
U303
443-875
U357
443-1098
U349
443-1166
U351
443-1058
U323
443-1034
U307
443-915
U339
443-891
J302
J305
U358
443-1098
U337
443-906
U310
443-1037
U312
443-1165
U308
443-1165
U356
443-1070
U354
443-1058
U311
443-1031
U336
444-231
U315
443-1037
U359
443-1058
U360
443-1058
U316
443-1037
U314
443-1165
U309
443-1165
U355
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U353
443-1058
U352
443-1031
U361
443-1058
U340
443-1058
U304
443-755
U362
U313, U347
U303, U347
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U345, U317
U321
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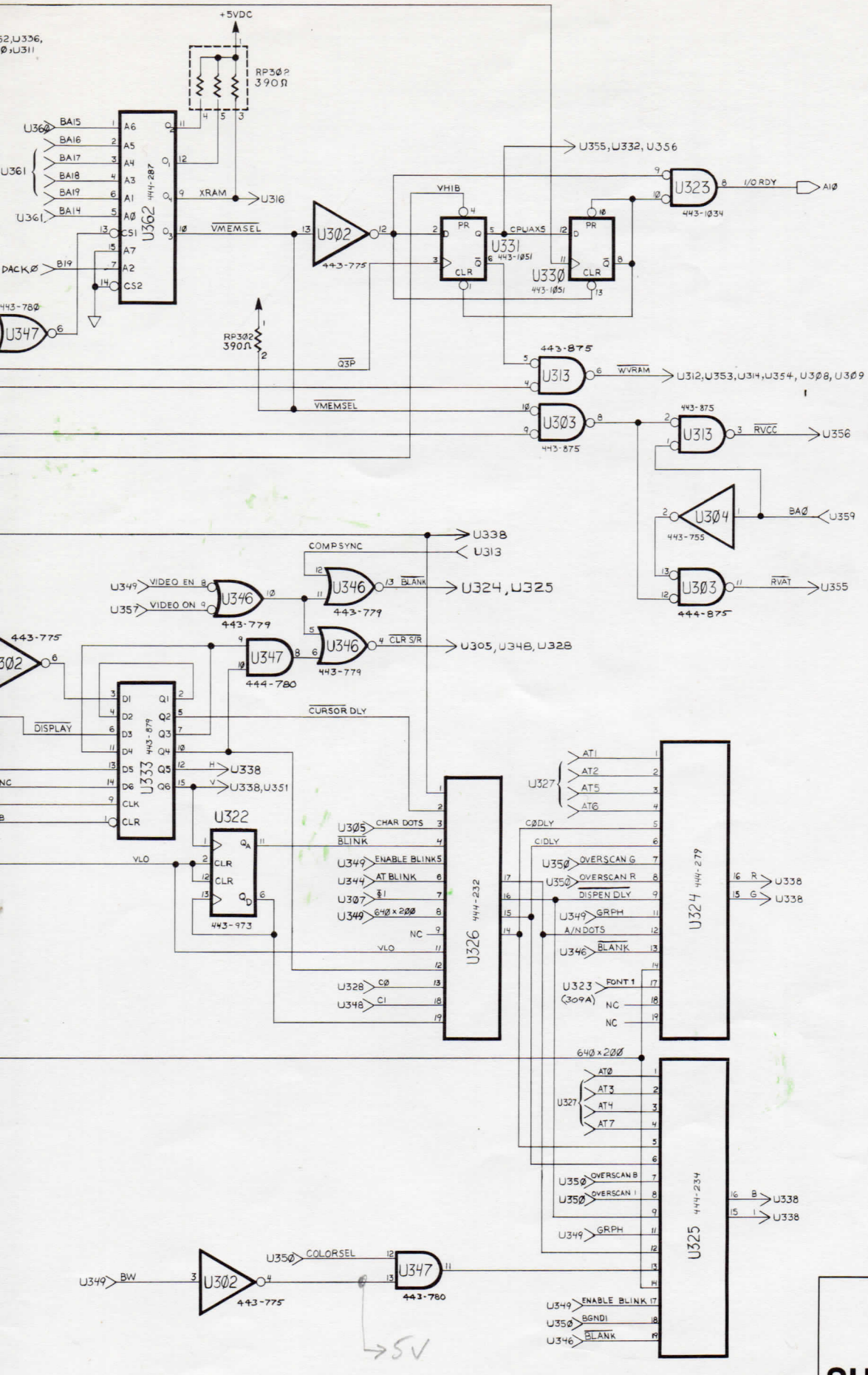
U332, U331
U323



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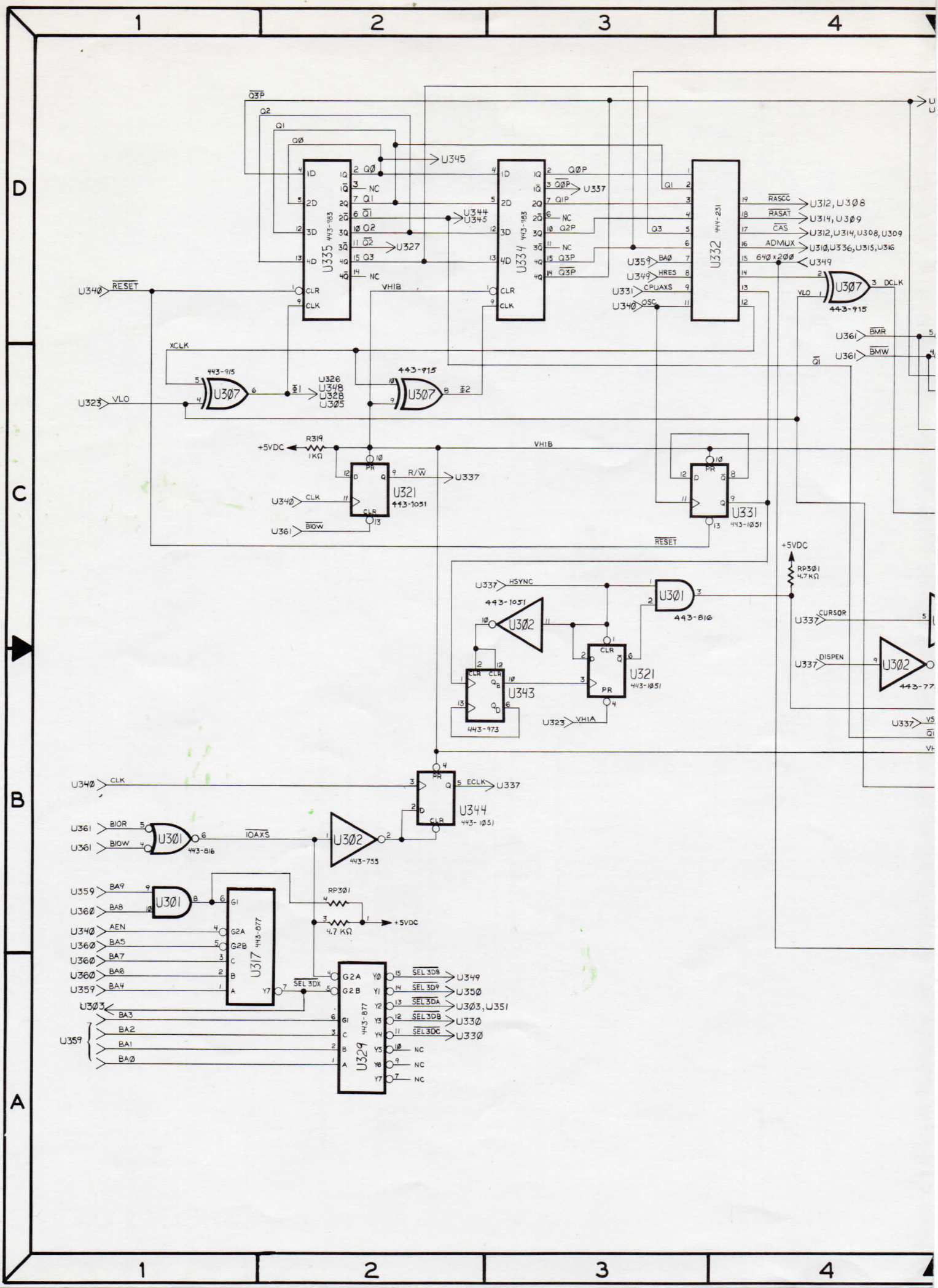
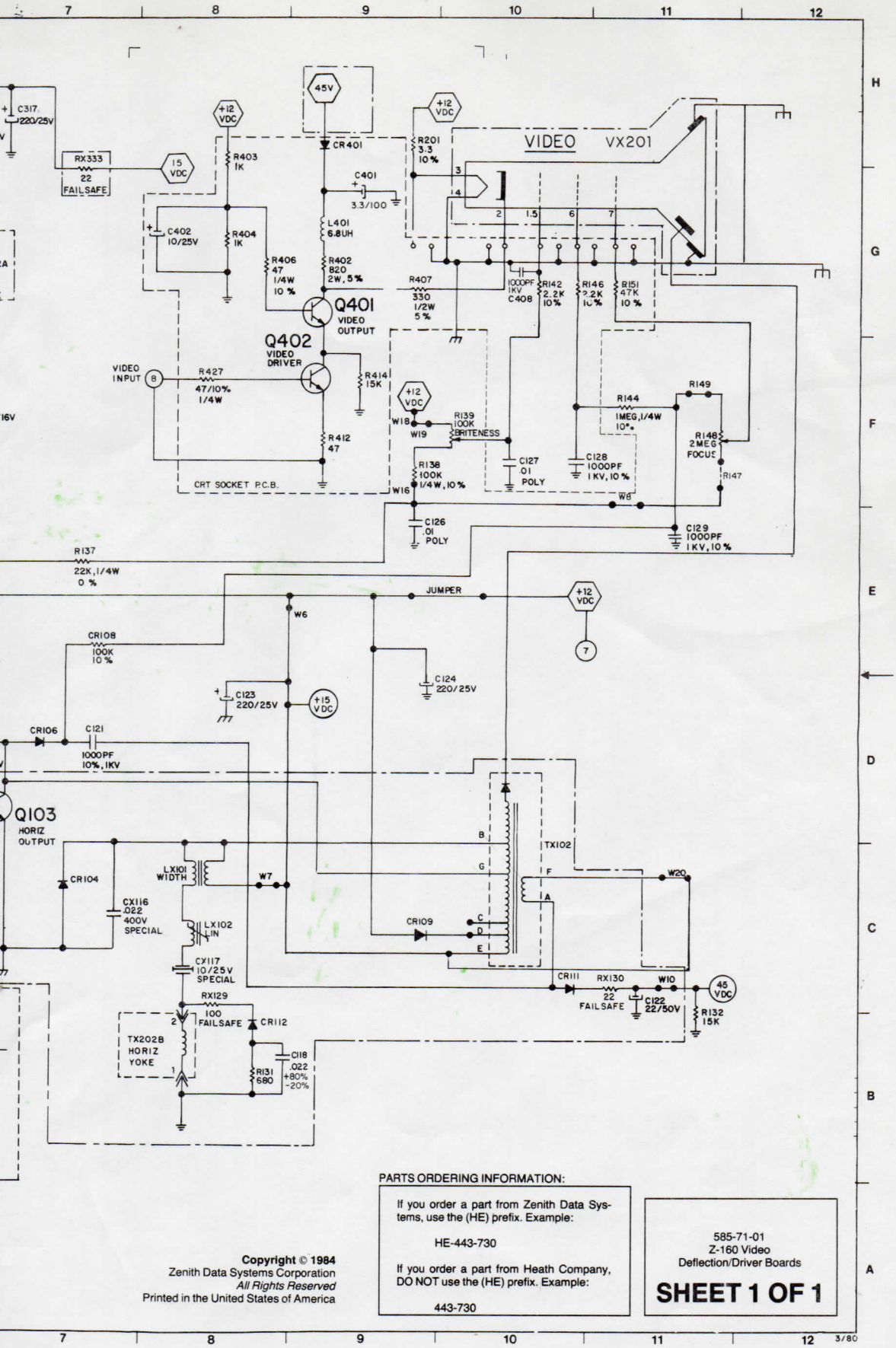
Z-309A COLOR VIDEO

SHEET 2 OF 2


1
2
3
4
D
C
B
A
U335 443-983
U334 443-983
U332 444-231
U307 443-915
U321 443-1051
U331 443-1051
U343 443-973
U344 443-1051
U301 443-816
U302 443-755
U317 443-877
U329 443-877
Q3P
Q2
Q1
Q0
U345
U344
U345
U327
U337
U340 RESET
VH1B
XCLK
U323 VLO
U326
U348
U328
U305
R319
1KΩ
+5VDC
R/W
CLK
BIOW
RESET
HSYNC
CURSOR
DISPEN
VH1A
ECLK
BIOR
IOAXS
RP301
4.7 KΩ
BA9
BA8
AEN
BA5
BA7
BA6
BA4
BA3
BA2
BA1
BA0
SEL 3DX
SEL 3D8
SEL 3D9
SEL 3DA
SEL 3DB
SEL 3DC
U349
U350
U303, U351
U330
U330
NC
RASCC
RASAT
CAS
ADMUX
640x200
U312, U308
U314, U309
U312, U314, U308, U309
U310, U336, U315, U316
U349
BA0
HRES
CPUAXS
OSC
BMR
BMW
DCLK
VLO



PARTS ORDERING INFORMATION:

If you order a part from Zenith Data Systems, use the (HE) prefix. Example:

HE-443-730

If you order a part from Heath Company, DO NOT use the (HE) prefix. Example:

443-730

585-71-01
Z-160 Video
Deflection/Driver Boards

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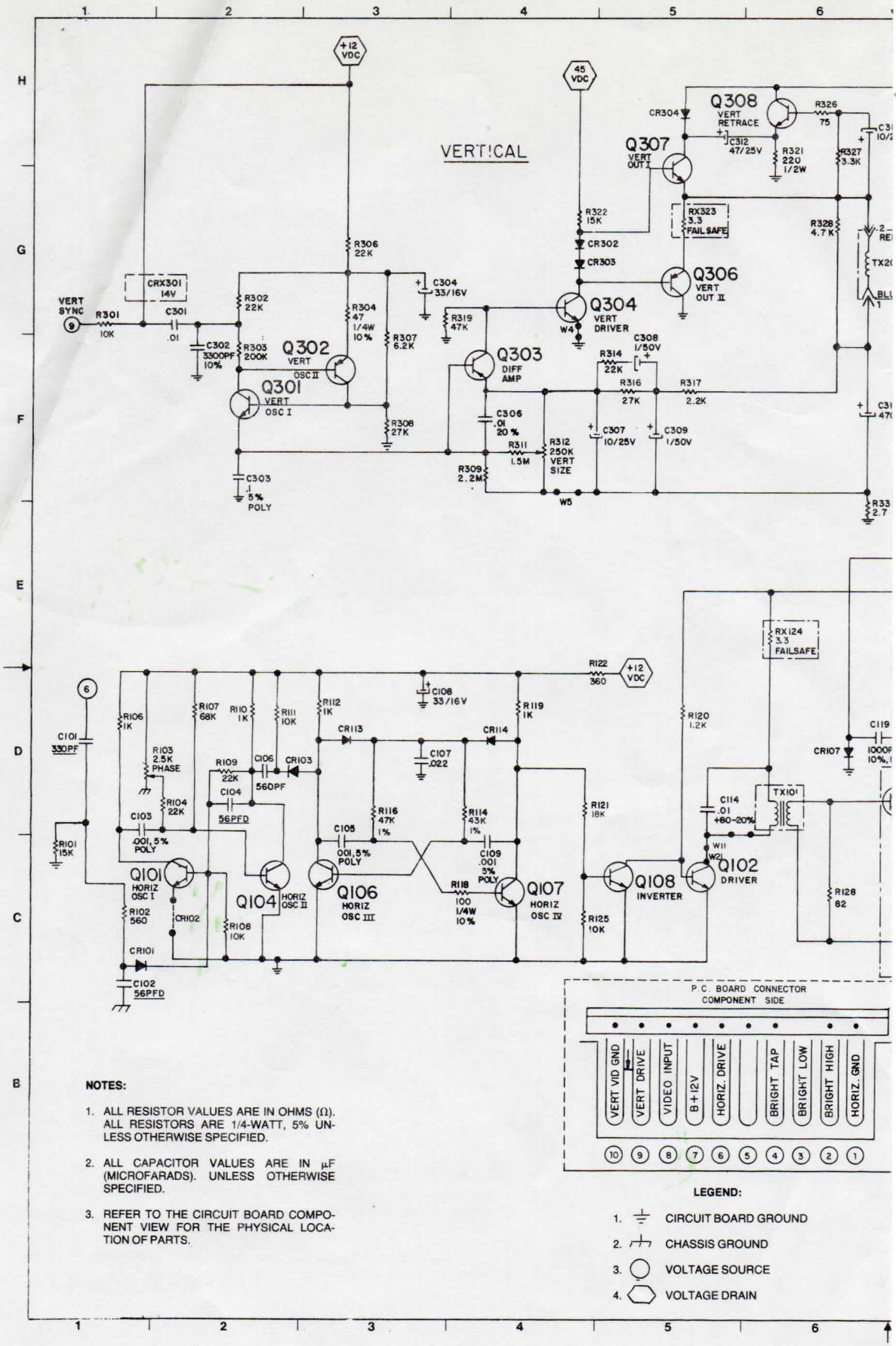
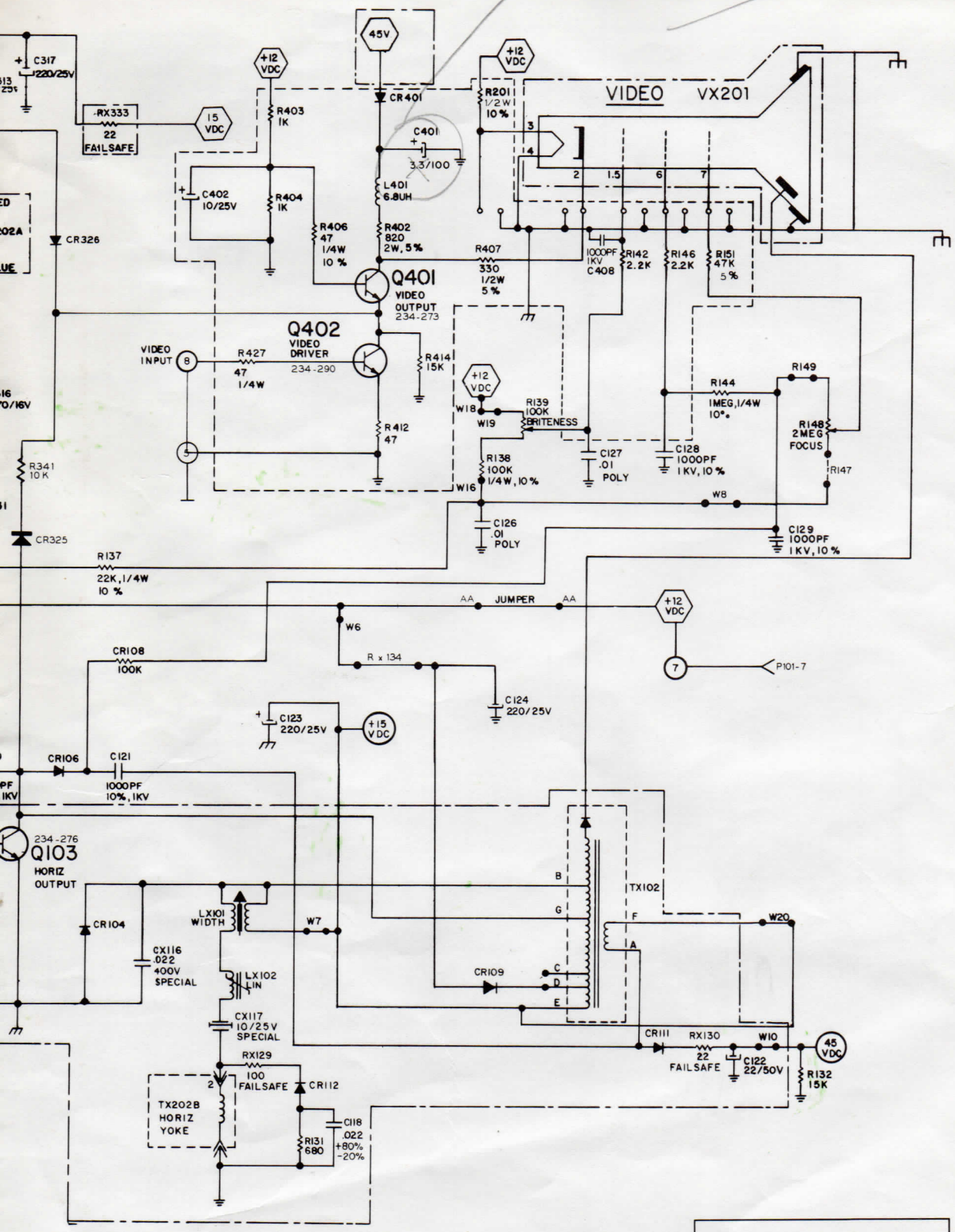


NOTES:

1. ALL RESISTOR VALUES ARE IN OHMS (Ω). ALL RESISTORS ARE 1/4-WATT, 5% UNLESS OTHERWISE SPECIFIED.
2. ALL CAPACITOR VALUES ARE IN μF (MICROFARADS). UNLESS OTHERWISE SPECIFIED.
3. REFER TO THE CIRCUIT BOARD COMPONENT VIEW FOR THE PHYSICAL LOCATION OF PARTS.

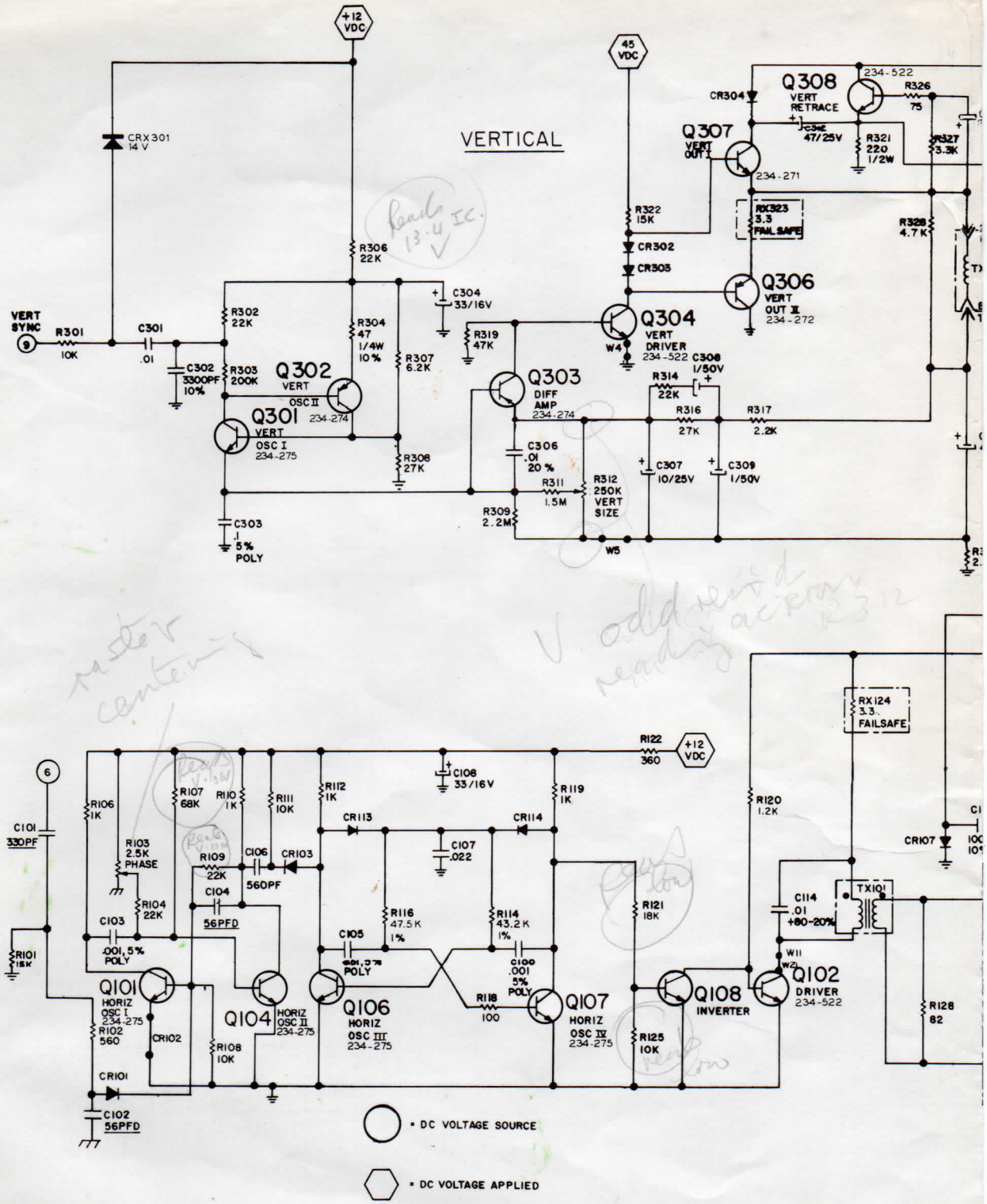
LEGEND:

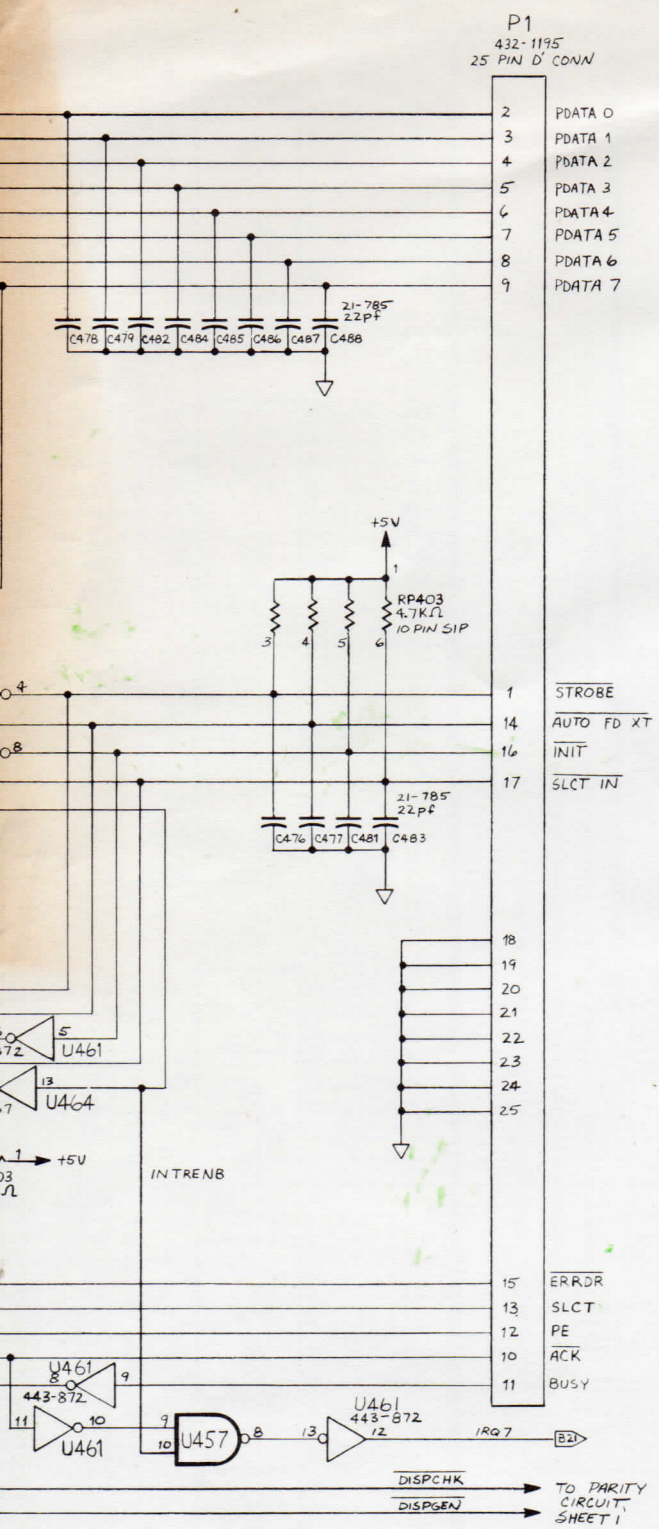
1. CIRCUIT BOARD GROUND
2. CHASSIS GROUND
3. VOLTAGE SOURCE
4. VOLTAGE DRAIN

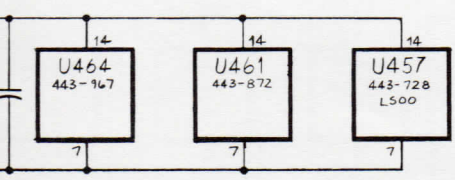


VIDEO MONITOR AND
VIDEO DRIVER BOARDS

SHEET 1 OF 1


VERTICAL
+12 VDC
45 VDC
CRX301 14 V
VERT SYNC
9
R301 10K
C301 .01
C302 3300PF 10%
R302 22K
R303 200K
Q302 VERT OSC II 234-274
Q301 VERT OSC I 234-275
C303 .1 5% POLY
R304 47 1/4W 10%
R306 22K
R307 6.2K
R308 27K
C304 33/16V
R319 47K
Q303 DIFF AMP 234-274
C306 .01 20%
R309 2.2M
R311 1.5M
R312 250K VERT SIZE
W5
R314 22K
C308 1/50V
R316 27K
R317 2.2K
C307 10/25V
C309 1/50V
W4
Q304 VERT DRIVER 234-522
R322 15K
CR302
CR303
Q306 VERT OUT II 234-272
Q307 VERT OUT I 234-271
CR304
Q308 VERT RETRACE
234-522
R326 75
C312 47/25V
R321 220 1/2W
RX323 3.3 FAIL SAFE
R327 3.3K
R328 4.7K
R122 360
6
C101 330PF
R106 1K
R107 68K
R110 1K
R111 10K
R112 1K
C108 33/16V
R119 1K
R120 1.2K
RX124 3.3 FAILSAFE
CR107
R103 2.5K PHASE
R109 22K
C106
CR103
560PF
C104 56PFD
R104 22K
C103 .001, 5% POLY
R101 15K
CR113
CR114
C107 .022
R116 47.5K 1%
R114 43.2K 1%
C105 .001, 5% POLY
C109 .001 5% POLY
R118 100
R121 18K
C114 .01 +80-20%
TX101
W11
W12
Q101 HORIZ OSC I 234-275
R102 560
CR102
CR101
C102 56PFD
Q104 HORIZ OSC II 234-275
R108 10K
Q106 HORIZ OSC III 234-275
Q107 HORIZ OSC IV 234-275
R125 10K
Q108 INVERTER
Q102 DRIVER 234-522
R128 82
= DC VOLTAGE SOURCE
= DC VOLTAGE APPLIED





HEATH ZENITH

NOTES:

1. ALL RESISTOR VALUES ARE IN OHMS (k = 1,000, M = 1,000,000) ALL RESISTORS ARE 1/4-WATT, 5% UNLESS OTHERWISE SPECIFIED.
2. ALL CAPACITOR VALUES ARE IN µF (MICROFARADS), UNLESS OTHERWISE SPECIFIED.
3. REFER TO THE CIRCUIT BOARD COMPONENT VIEW FOR THE PHYSICAL LOCATION OF PARTS.

LEGEND:

1. CIRCUIT BOARD GROUND
2. +5 V
3. BUS SIGNAL
4. MECHANICAL CONNECTION
5. DIRECTION TO
6. DIRECTION FROM
7. NO CONNECTION
8. CONNECTION

PARTS ORDERING INFORMATION:

If you order a part from Zenith Data Systems, use the (HE) prefix. Example:

HE 443-730

If you order a part from Heath Company, DO NOT use the (HE) prefix. Example:

443-730

For semiconductor type numbers (Example: 74LS153), refer to the "Semiconductor Identification Chart."

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H-160 DYNAMIC MEMORY CARD MEMORY

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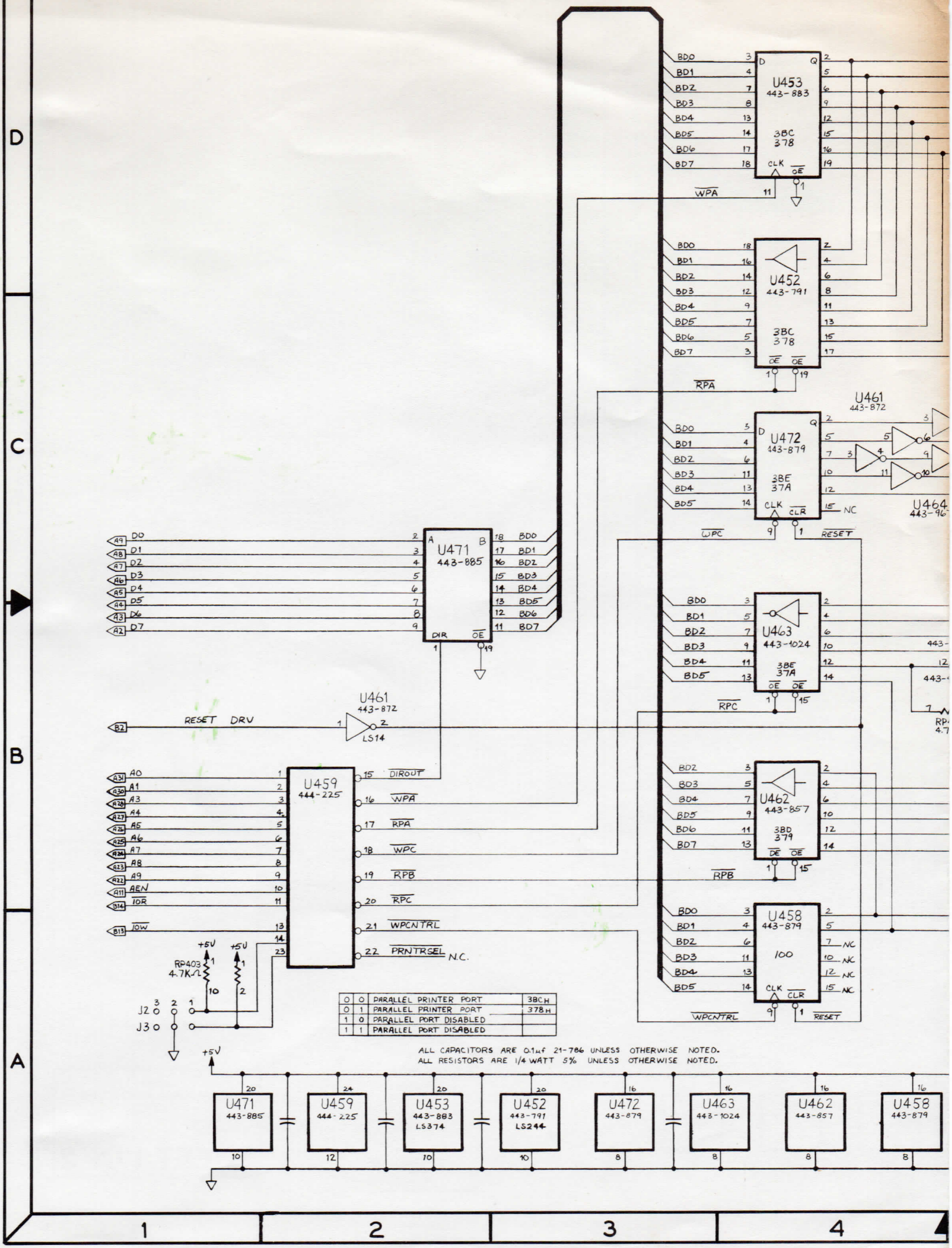
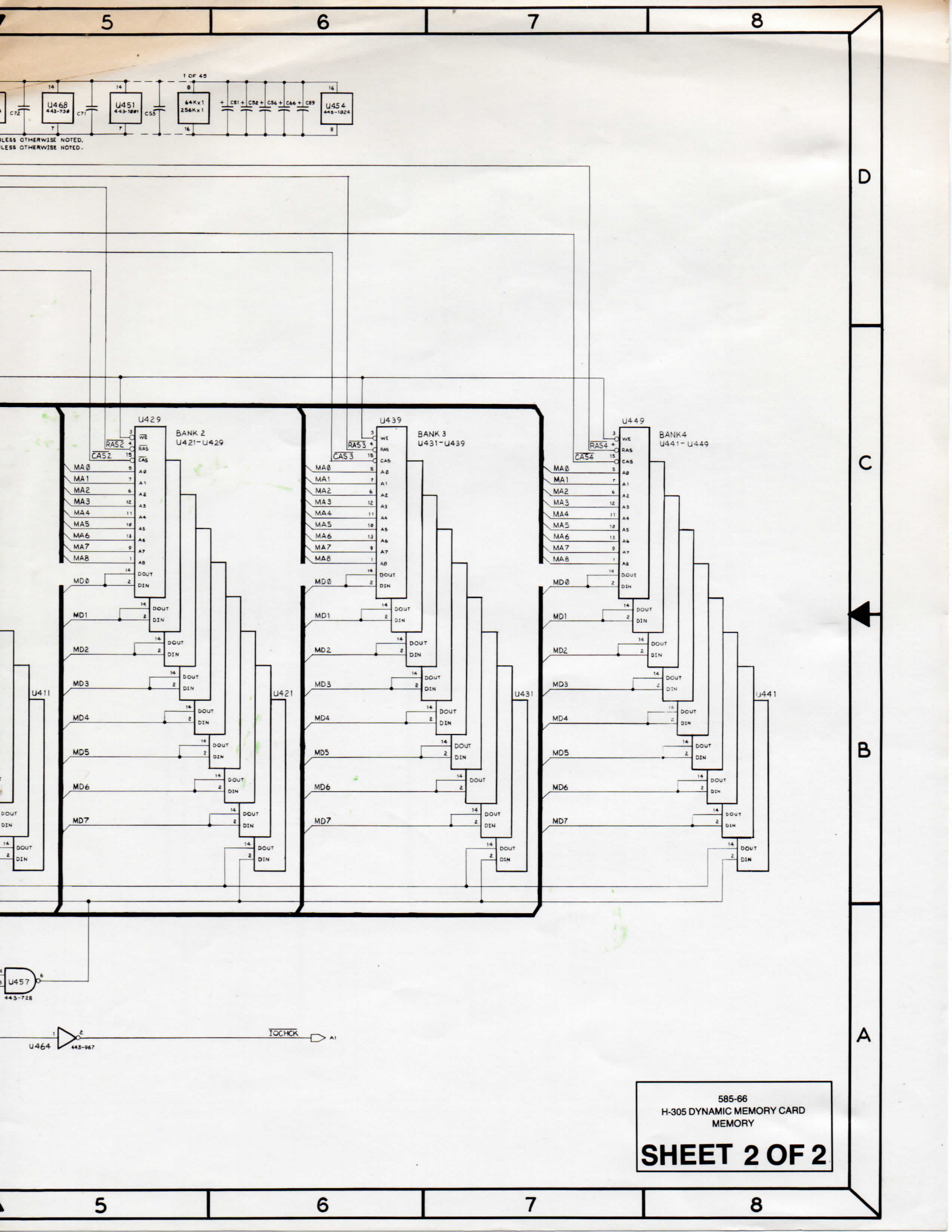
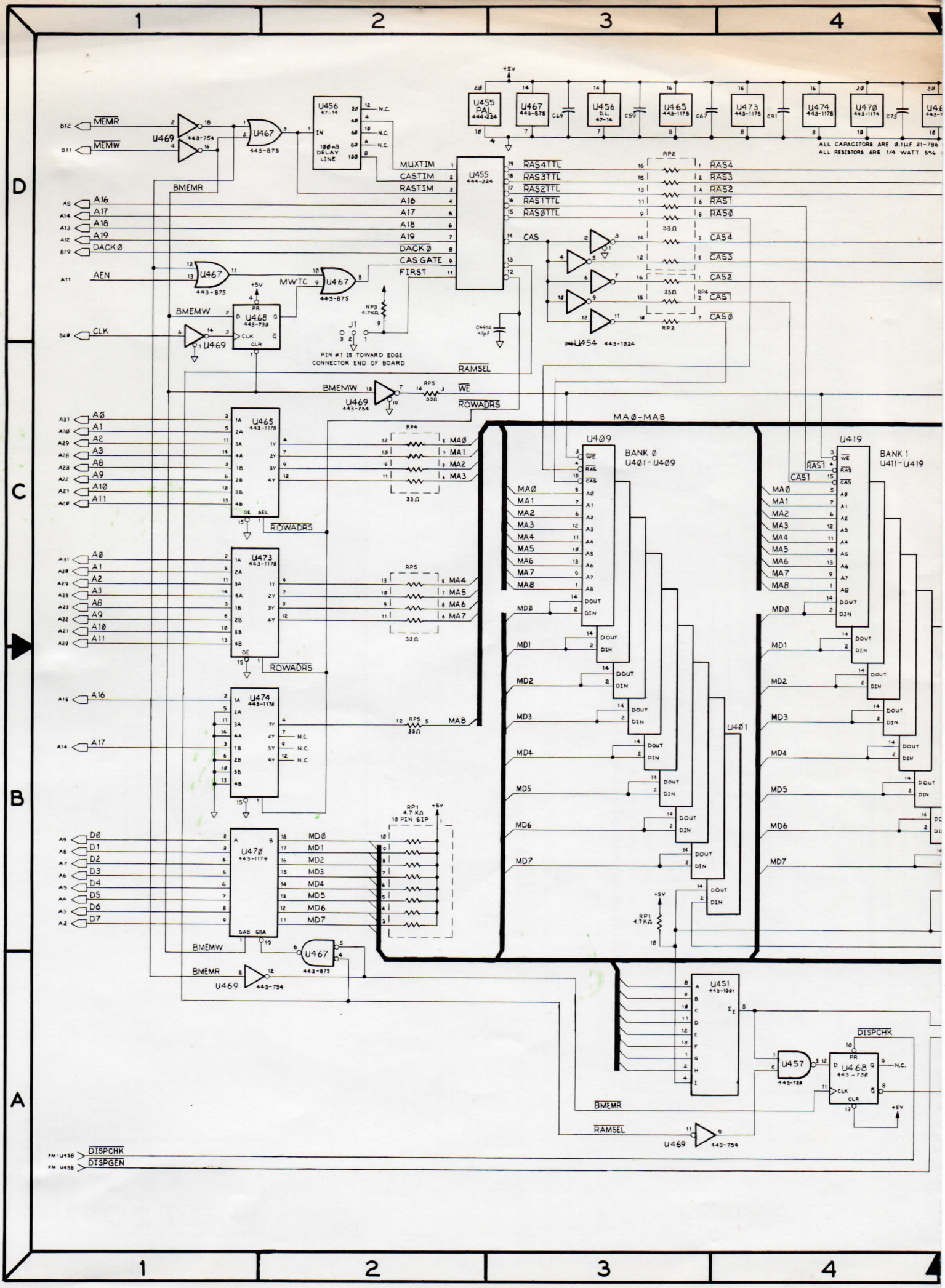


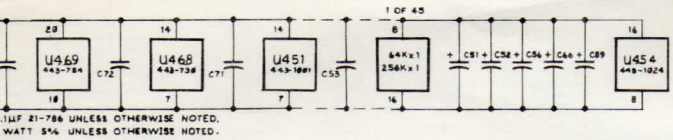
0	0	PARALLEL PRINTER PORT	3BCH
0	1	PARALLEL PRINTER PORT	378H
1	0	PARALLEL PORT DISABLED	
1	1	PARALLEL PORT DISABLED	



585-66
H-305 DYNAMIC MEMORY CARD
MEMORY

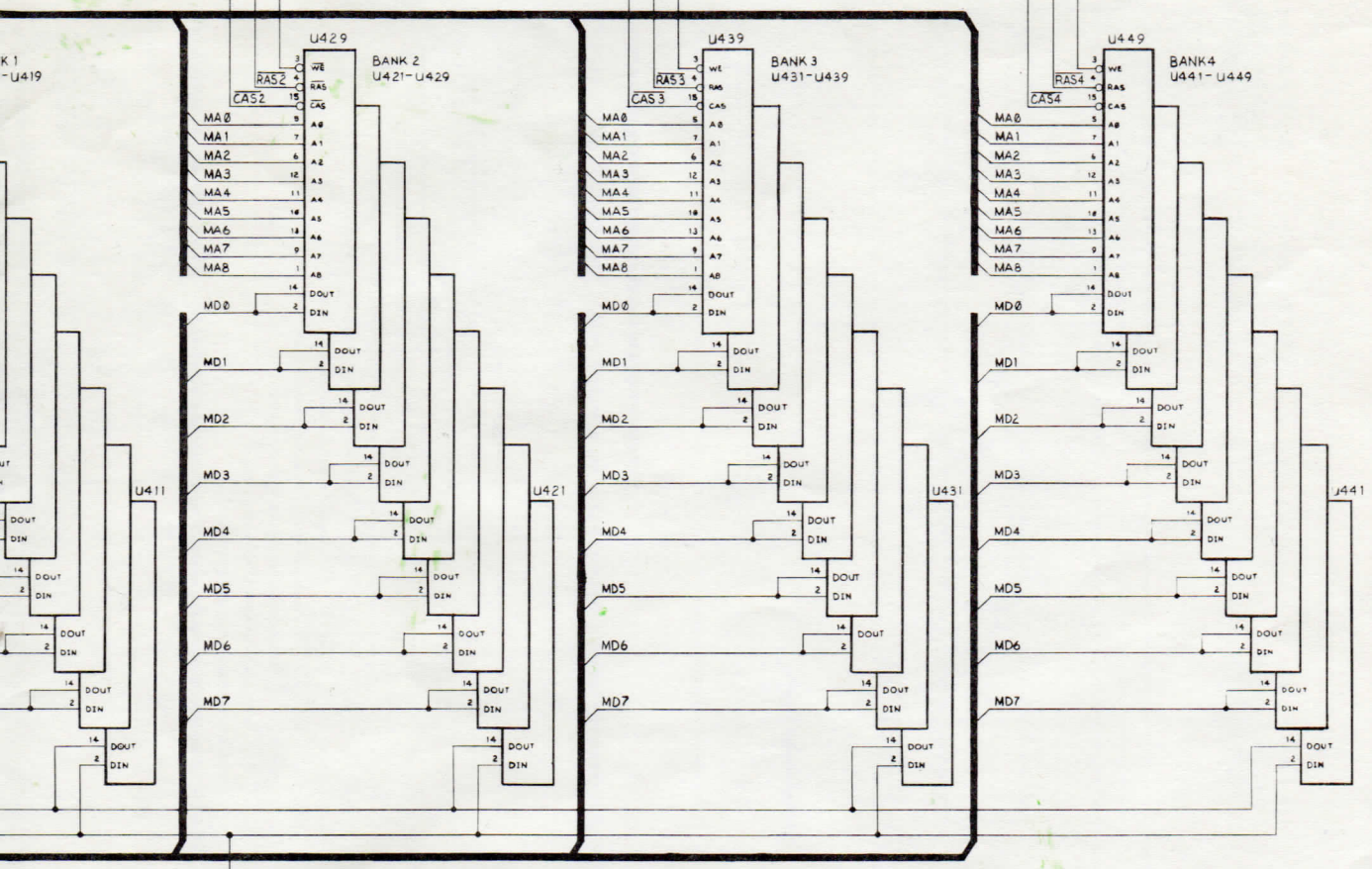
SHEET 2 OF 2


1
2
3
4
D
C
B
A
MEMR
MEMW
U469
443-754
U467
443-875
U456
47-14
180 nS DELAY LINE
N.C.
MUXTIM
CASTIM
RASTIM
A16
A17
A18
A19
DACKØ
CASGATE
FIRST
U455
444-224
+5V
U455 PAL 444-224
U467 443-875
U456 D.L. 47-14
U465 443-1178
U473 443-1178
U474 443-1178
U47Ø 443-1174
ALL CAPACITORS ARE .1µF 21-786
ALL RESISTORS ARE 1/4 WATT 5%
RAS4TTL
RAS3TTL
RAS2TTL
RAS1TTL
RASØTTL
CAS
RP2
RAS4
RAS3
RAS2
RAS1
RASØ
33Ω
CAS4
CAS3
CAS2
CAS1
CASØ
RP4
U454 443-1824
AEN
MWTC
BMEMW
CLK
U468 443-738
PR
CLR
RP3 4.7KΩ
J1
PIN #1 IS TOWARD EDGE CONNECTOR END OF BOARD
C491A 47pF
RAMSEL
WE
ROWADRS
RP5
MAØ-MA8
U465 443-1178
MAØ
MA1
MA2
MA3
MA4
MA5
MA6
MA7
MA8
U473 443-1178
U474 443-1178
U47Ø 443-1174
U409
BANK Ø
U4Ø1-U4Ø9
U419
BANK 1
U411-U419
U4Ø1
MDØ
MD1
MD2
MD3
MD4
MD5
MD6
MD7
DOUT
DIN
RP1 4.7 KΩ 10 PIN SIP
U451 443-1081
U457 443-728
DISPCHK
DISPGEN
FM U458
FM U458

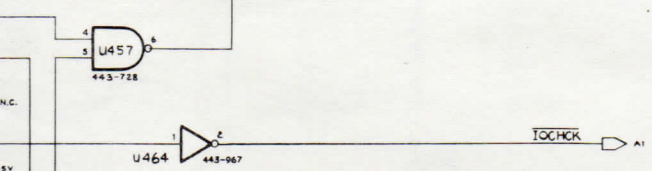


.1UF 21-786 UNLESS OTHERWISE NOTED.
WATT 5% UNLESS OTHERWISE NOTED.

PLACE A 0.1UF CAPACITOR
AT EACH MEMORY DEVICE.
P/N 21-786 W/.3" LEAD SPACING.



Z-150 DYNAMIC MEMORY



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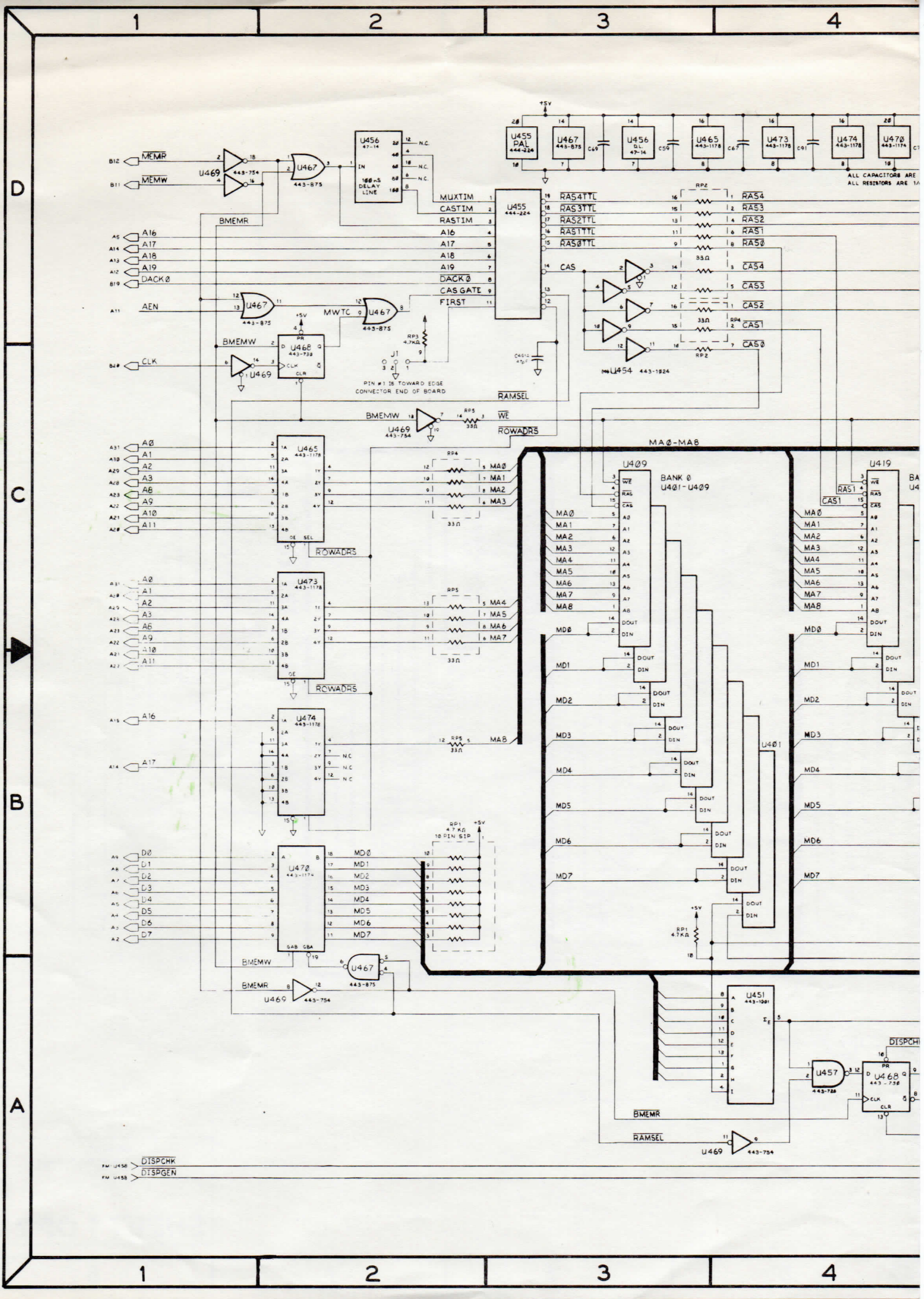
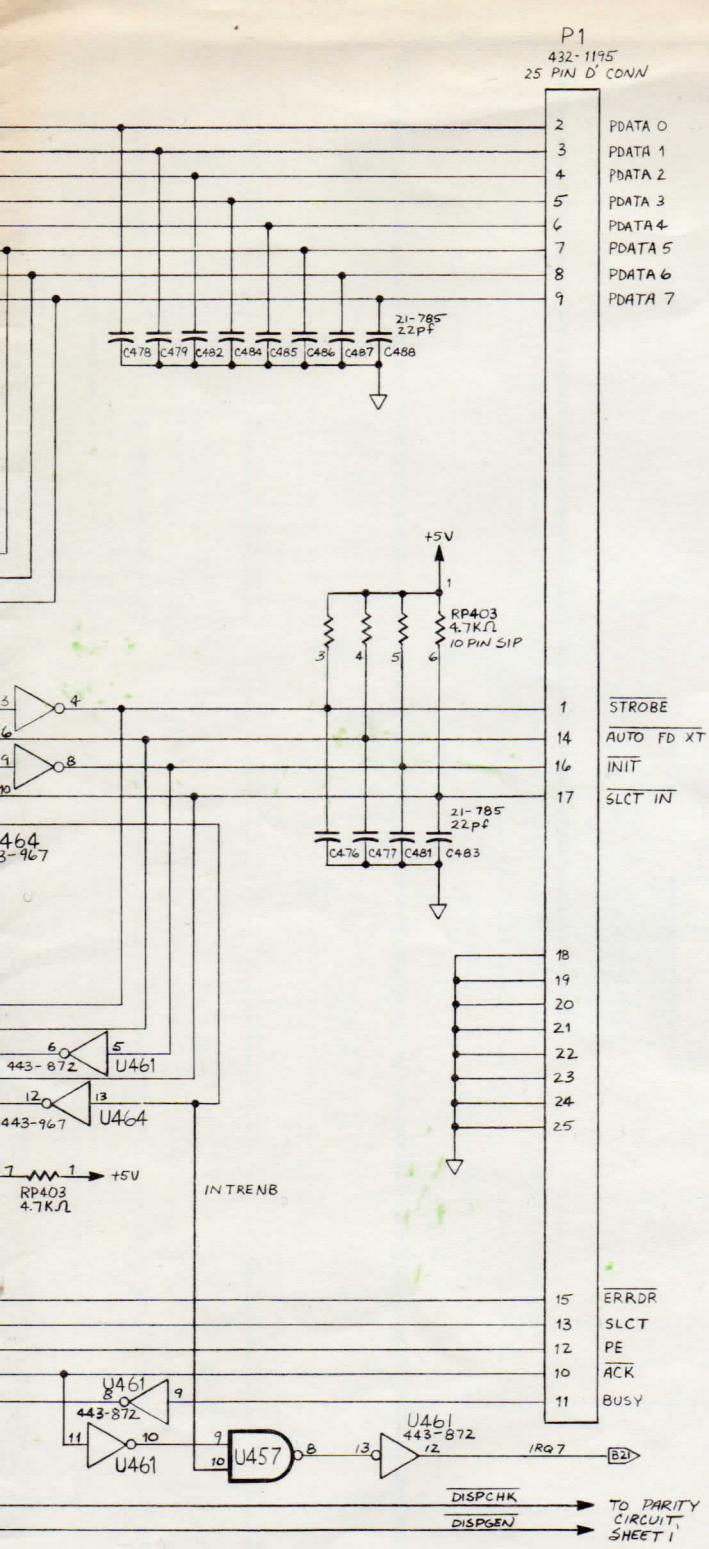
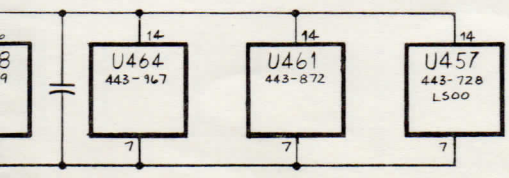
Z-150 DYNAMIC MEMORY CARD

SHEET 1 OF 2


MEMR
MEMW
BMEMR
A16
A17
A18
A19
DACKØ
AEN
CLK
MUXTIM
CASTIM
RASTIM
DACKØ
CAS GATE
FIRST
MWTC
BMEMW
RAMSEL
WE
ROWADRS
RAS4TTL
RAS3TTL
RAS2TTL
RAS1TTL
RASØTTL
CAS
RAS4
RAS3
RAS2
RAS1
RASØ
CAS4
CAS3
CAS2
CAS1
CASØ
MAØ-MA8
BANK Ø
U4Ø1 - U4Ø9
MAØ
MA1
MA2
MA3
MA4
MA5
MA6
MA7
MA8
MDØ
MD1
MD2
MD3
MD4
MD5
MD6
MD7
DØ
D1
D2
D3
D4
D5
D6
D7
PIN #1 IS TOWARD EDGE CONNECTOR END OF BOARD
ALL CAPACITORS ARE
ALL RESISTORS ARE
DISPCHK
DISPGEN





HEATH ZENITH

NOTES:

1. ALL RESISTOR VALUES ARE IN OHMS (k = 1,000, M = 1,000,000) ALL RESISTORS ARE 1/4-WATT, 5% UNLESS OTHERWISE SPECIFIED.
2. ALL CAPACITOR VALUES ARE IN μF (MICROFARADS), UNLESS OTHERWISE SPECIFIED.
3. REFER TO THE CIRCUIT BOARD COMPONENT VIEW FOR THE PHYSICAL LOCATION OF PARTS.

LEGEND:

1. CIRCUIT BOARD GROUND
2. +5 V
3. BUS SIGNAL
4. MECHANICAL CONNECTION
5. DIRECTION TO
6. DIRECTION FROM
7. NO CONNECTION
8. CONNECTION

PARTS ORDERING INFORMATION:

If you order a part from Zenith Data Systems, use the (HE) prefix. Example:

HE 443-730

If you order a part from Heath Company, DO NOT use the (HE) prefix. Example:

443-730

For semiconductor type numbers (Example: 74LS153), refer to the "Semiconductor Identification Chart."

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Z-150 DYNAMIC MEMORY CARD

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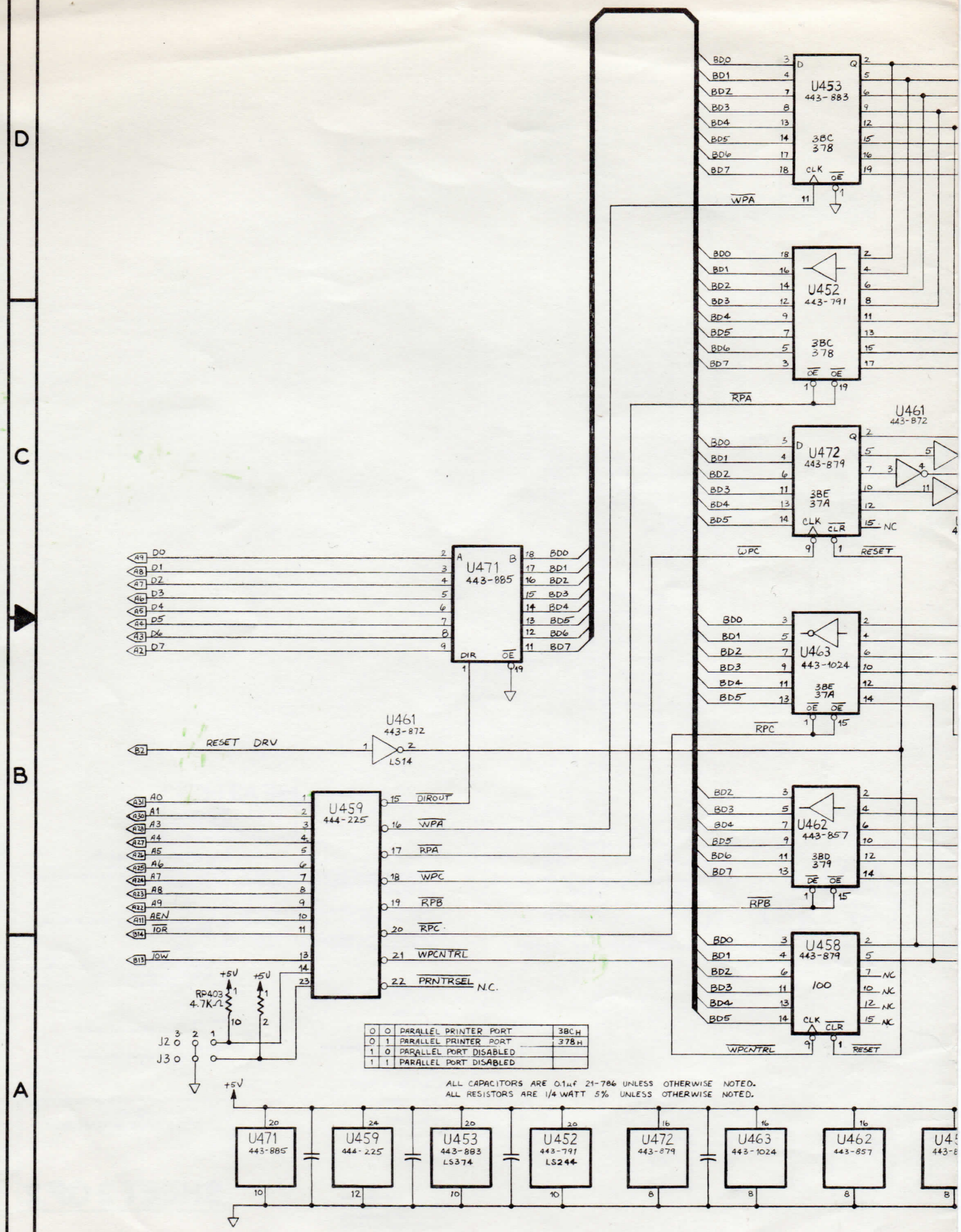
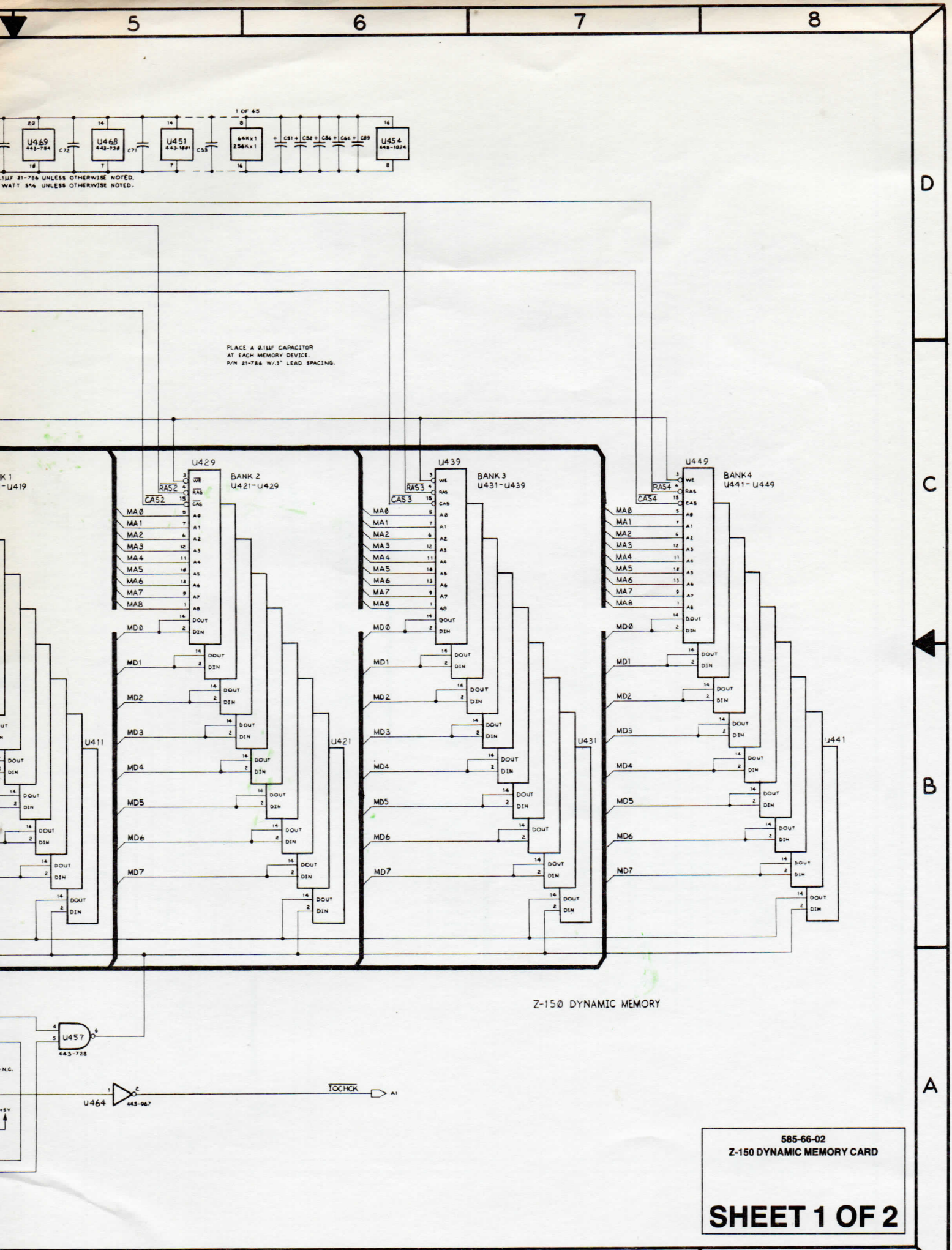


0	0	PARALLEL PRINTER PORT	3BCH
0	1	PARALLEL PRINTER PORT	378H
1	0	PARALLEL PORT DISABLED	
1	1	PARALLEL PORT DISABLED	


5
6
7
8
D
C
B
A
1 OF 45
U469
443-754
U468
443-738
U451
443-1001
64Kx1
256Kx1
U454
443-1024
C72
C71
C55
C51
C52
C54
C66
C69
.1UF 21-786 UNLESS OTHERWISE NOTED.
WATT 5% UNLESS OTHERWISE NOTED.
PLACE A 0.1UF CAPACITOR
AT EACH MEMORY DEVICE.
P/N 21-786 W/.3" LEAD SPACING.
U429
BANK 2
U421-U429
U439
BANK 3
U431-U439
U449
BANK4
U441-U449
RAS2
CAS2
RAS3
CAS3
RAS4
CAS4
WE
RAS
CAS
MA0
MA1
MA2
MA3
MA4
MA5
MA6
MA7
MA8
DOUT
DIN
MD0
MD1
MD2
MD3
MD4
MD5
MD6
MD7
U411
U421
U431
U441
Z-150 DYNAMIC MEMORY
U457
443-728
U464
443-967
IOCHCK
A1
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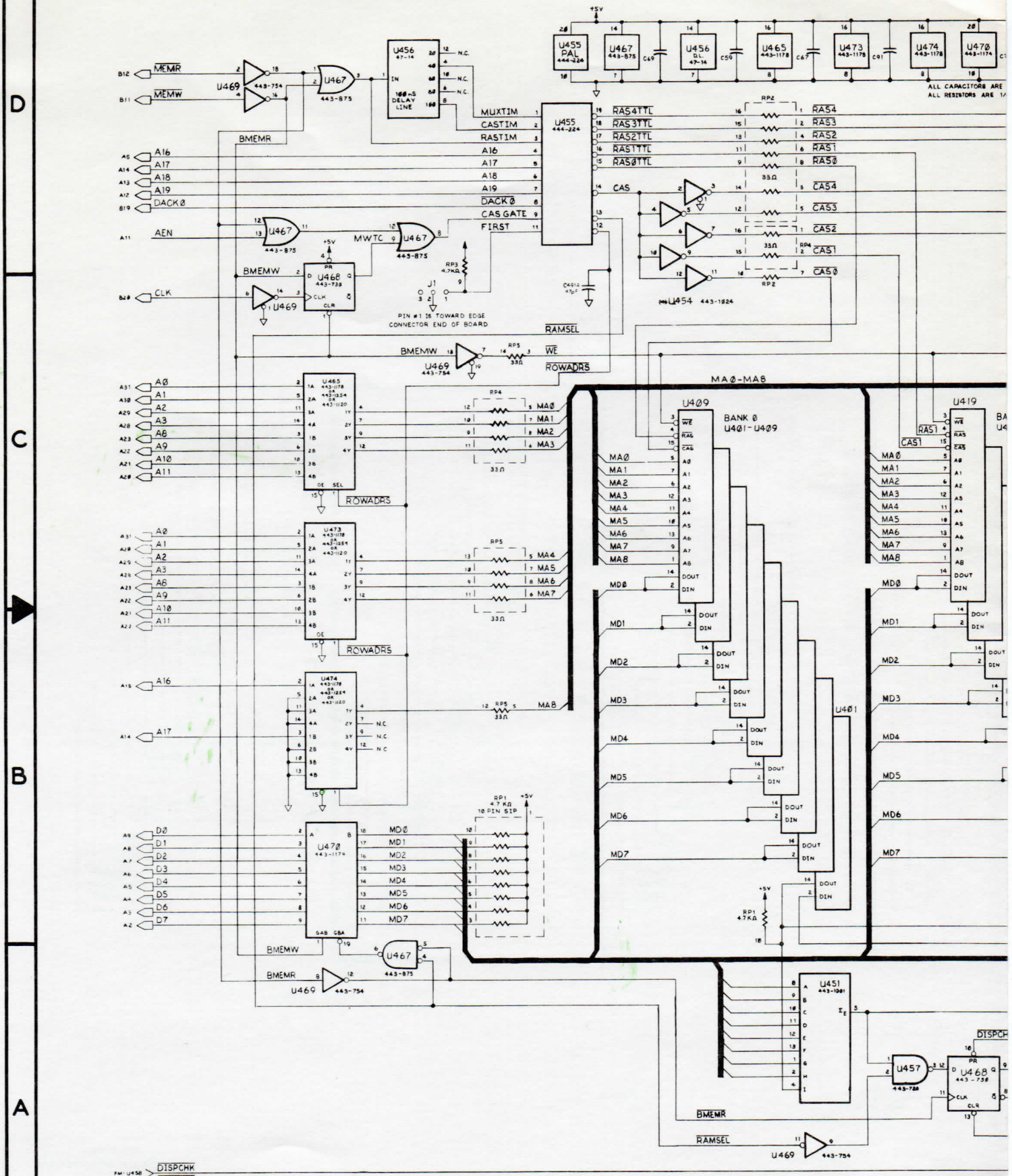
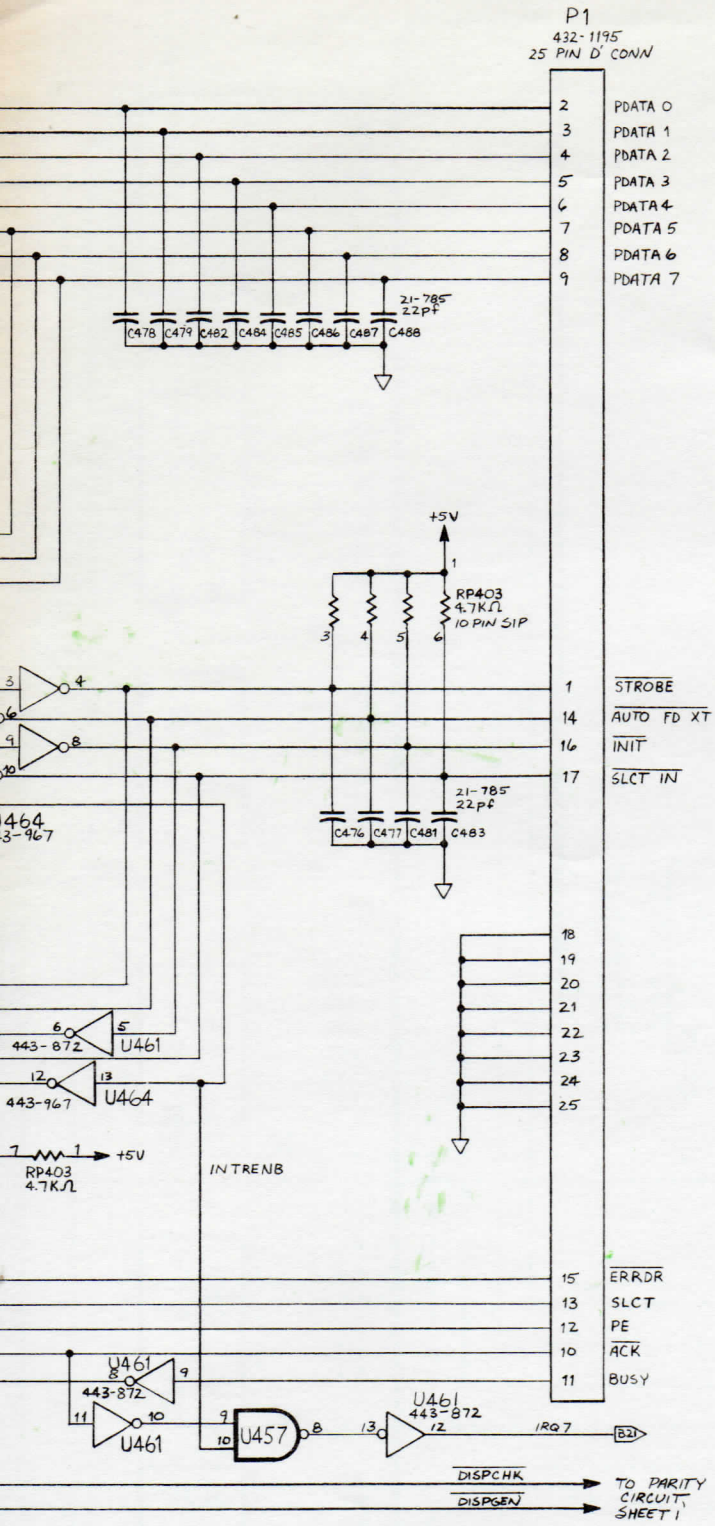
Z-150 DYNAMIC MEMORY CARD
SHEET 1 OF 2


MEMR
MEMW
BMEMR
A16
A17
A18
A19
DACKØ
AEN
CLK
BMEMW
MWTC
MUXTIM
CASTIM
RASTIM
CASGATE
FIRST
RAS4TTL
RAS3TTL
RAS2TTL
RAS1TTL
RASØTTL
CAS
RAS4
RAS3
RAS2
RAS1
RASØ
CAS4
CAS3
CAS2
CAS1
CASØ
RAMSEL
WE
ROWADRS
MAØ-MA8
BANK Ø
U401-U409
MAØ
MA1
MA2
MA3
MA4
MA5
MA6
MA7
MA8
MDØ
MD1
MD2
MD3
MD4
MD5
MD6
MD7
DØ
D1
D2
D3
D4
D5
D6
D7
DISPCHK
DISPGEN
PIN #1 IS TOWARD EDGE CONNECTOR END OF BOARD
ALL CAPACITORS ARE
ALL RESISTORS ARE



HEATH ZENITH

NOTES:

1. ALL RESISTOR VALUES ARE IN OHMS (k = 1,000, M = 1,000,000) ALL RESISTORS ARE 1/4-WATT, 5% UNLESS OTHERWISE SPECIFIED.
2. ALL CAPACITOR VALUES ARE IN µF (MICROFARADS), UNLESS OTHERWISE SPECIFIED.
3. REFER TO THE CIRCUIT BOARD COMPONENT VIEW FOR THE PHYSICAL LOCATION OF PARTS.

LEGEND:

1. CIRCUIT BOARD GROUND
2. +5 V
3. BUS SIGNAL
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5. DIRECTION TO
6. DIRECTION FROM
7. NO CONNECTION
8. CONNECTION

PARTS ORDERING INFORMATION:

If you order a part from Zenith Data Systems, use the (HE) prefix. Example:

HE 443-730

If you order a part from Heath Company, DO NOT use the (HE) prefix. Example:

443-730

For semiconductor type numbers (Example: 74LS153), refer to the "Semiconductor Identification Chart."

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Z-150 DYNAMIC MEMORY CARD

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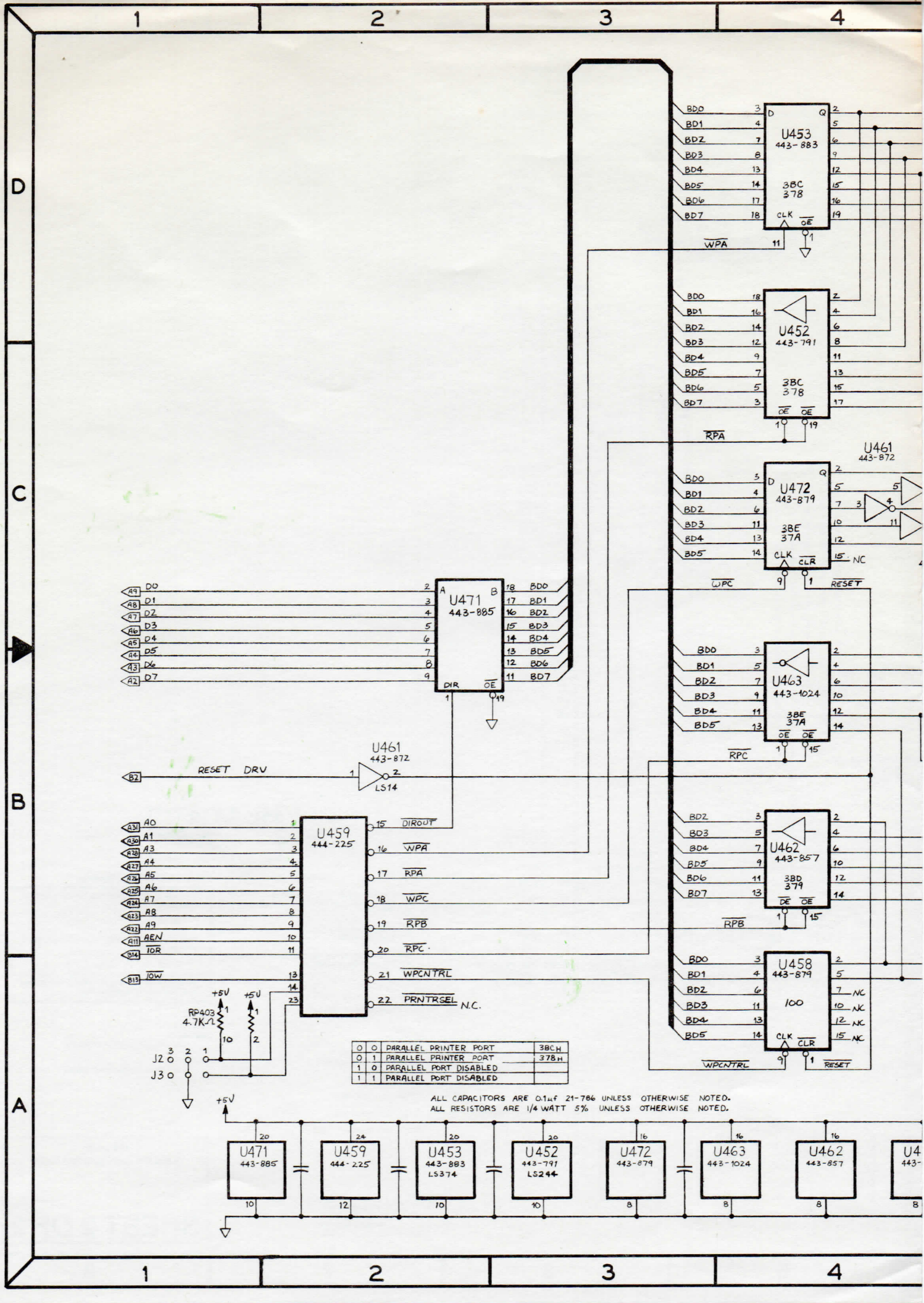
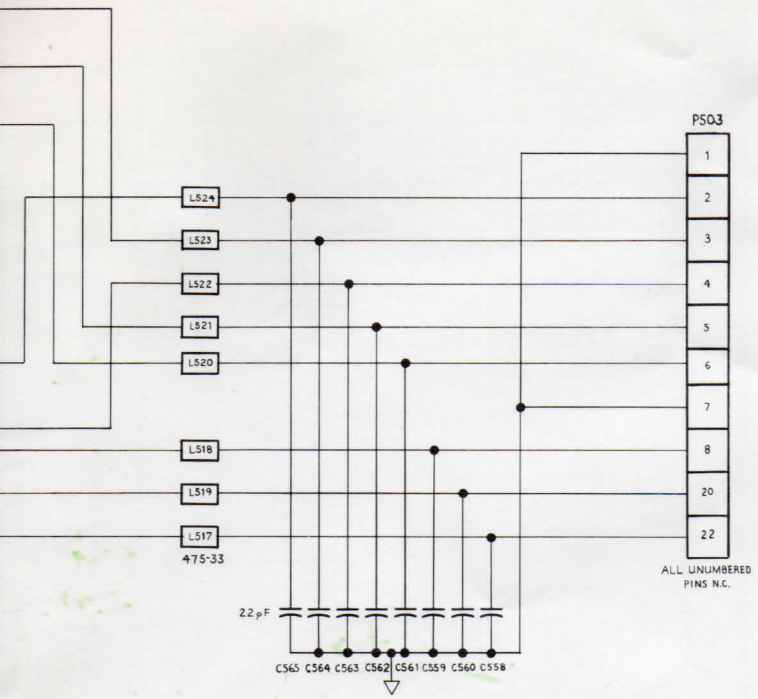
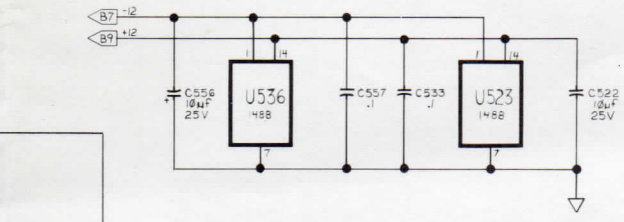
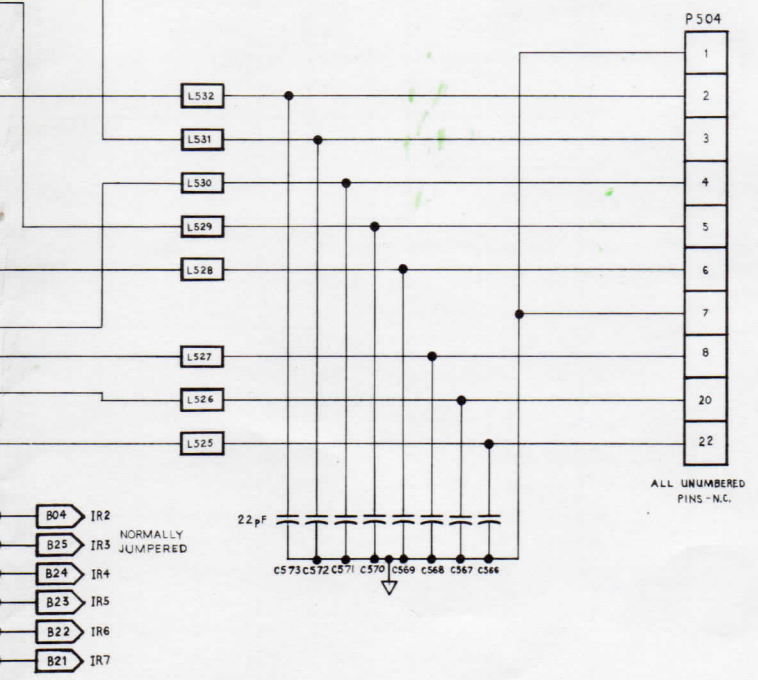


0	0	PARALLEL PRINTER PORT	3BCH
0	1	PARALLEL PRINTER PORT	378H
1	0	PARALLEL PORT DISABLED	
1	1	PARALLEL PORT DISABLED	

ALL CAPACITORS ARE 0.1μf 21-786 UNLESS OTHERWISE NOTED.
ALL RESISTORS ARE 1/4 WATT 5% UNLESS OTHERWISE NOTED.







HEATH ZENITH

NOTES:

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PARTS ORDERING INFORMATION:

If you order a part from Zenith Data Systems, use the (HE) prefix. Example:

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443-730

For semiconductor type numbers (Example: 74LS153), refer to the "Semiconductor Identification Chart."

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SERIAL INPUT/OUTPUT

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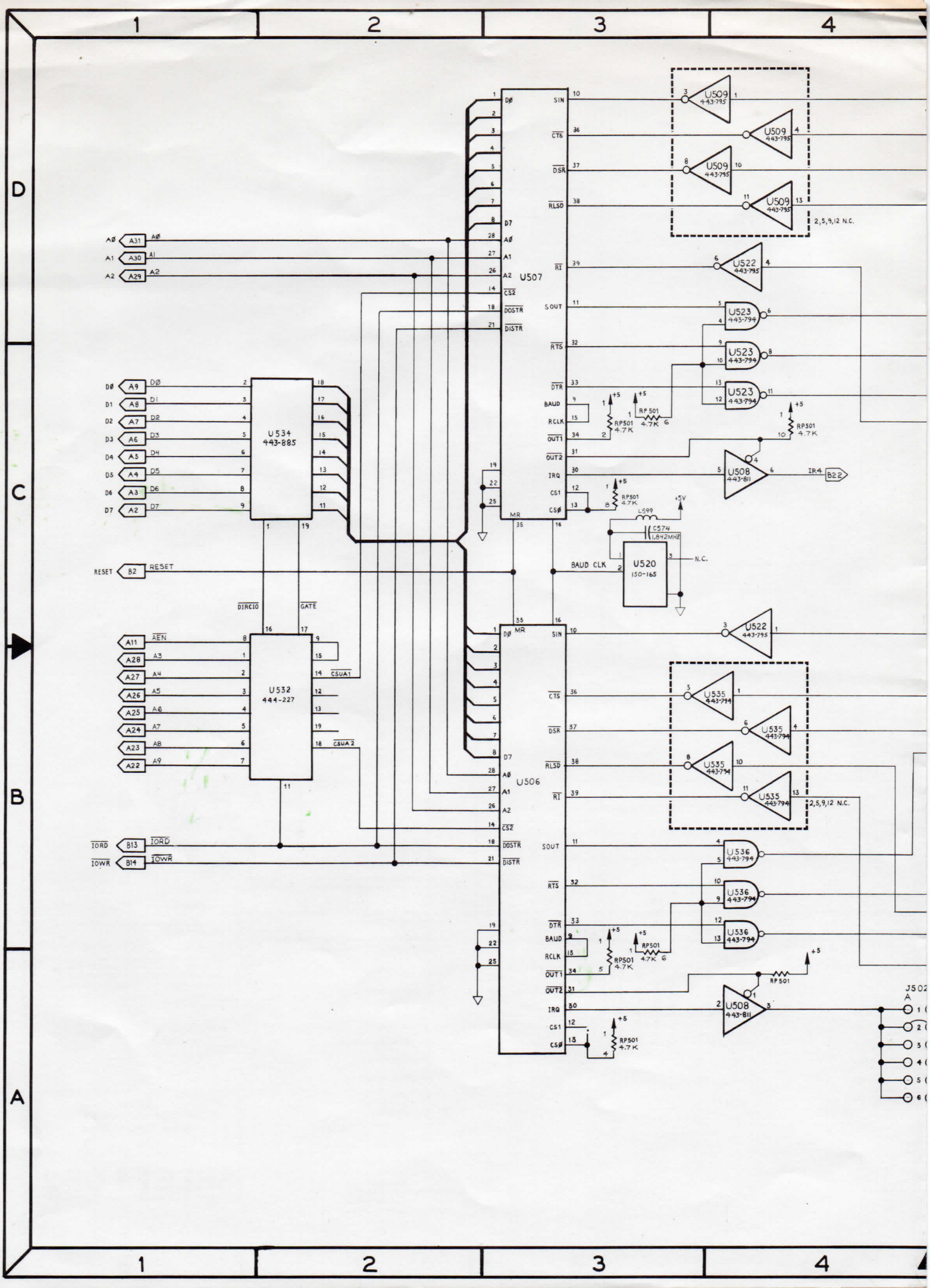
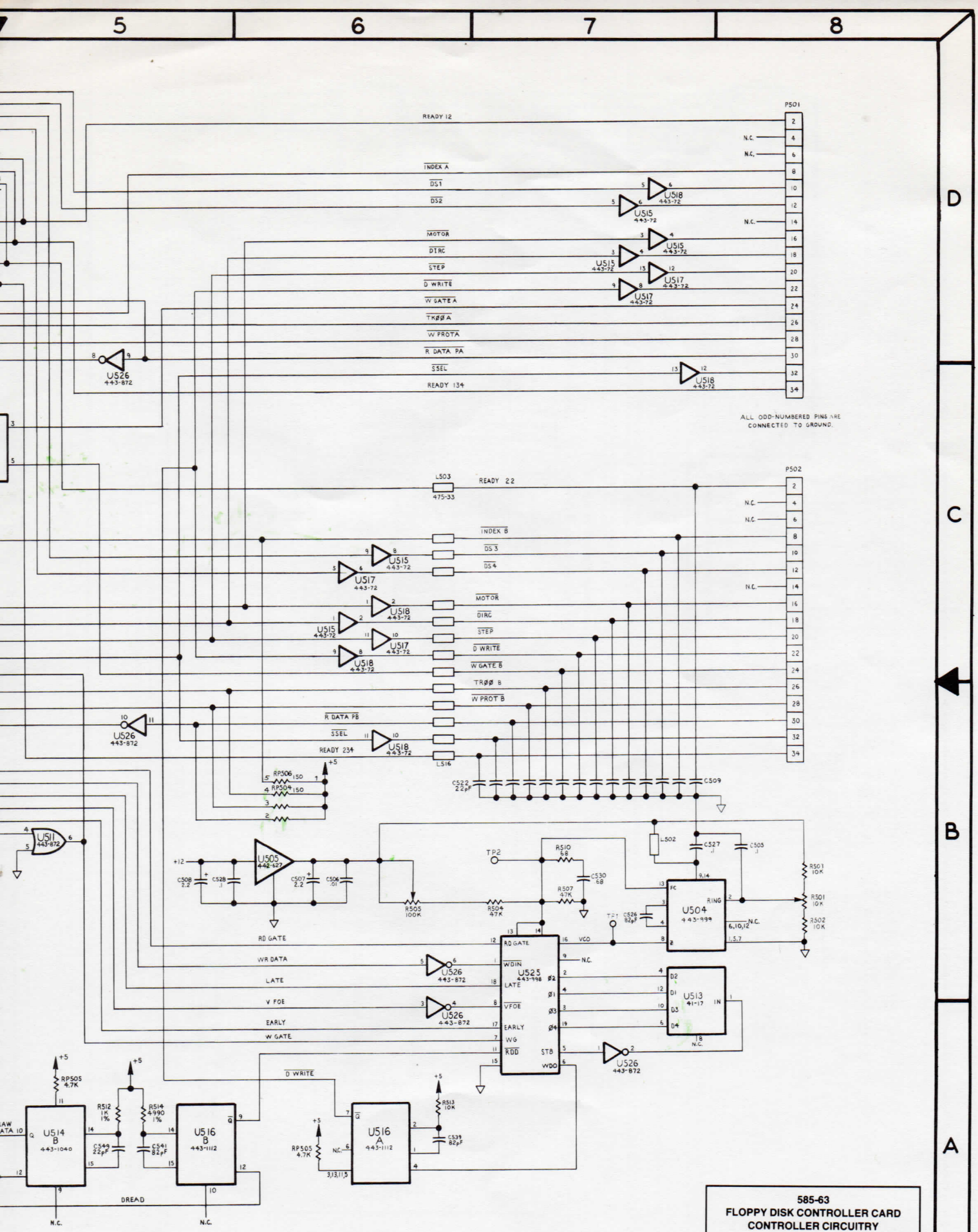

1
2
3
4
D
C
B
A
U507
U506
U534
443-885
U532
444-227
U520
150-165
U509
443-795
U522
443-795
U523
443-794
U508
443-811
U535
443-794
U536
443-794
RP501
4.7K
L599
C574
1.842MHZ
+5
+5V
RESET
B2
IORD
B13
IOWR
B14
BAUD CLK
N.C.
2,5,9,12 N.C.
IR4
B22
J502
A



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FLOPPY DISK CONTROLLER CARD
CONTROLLER CIRCUITRY

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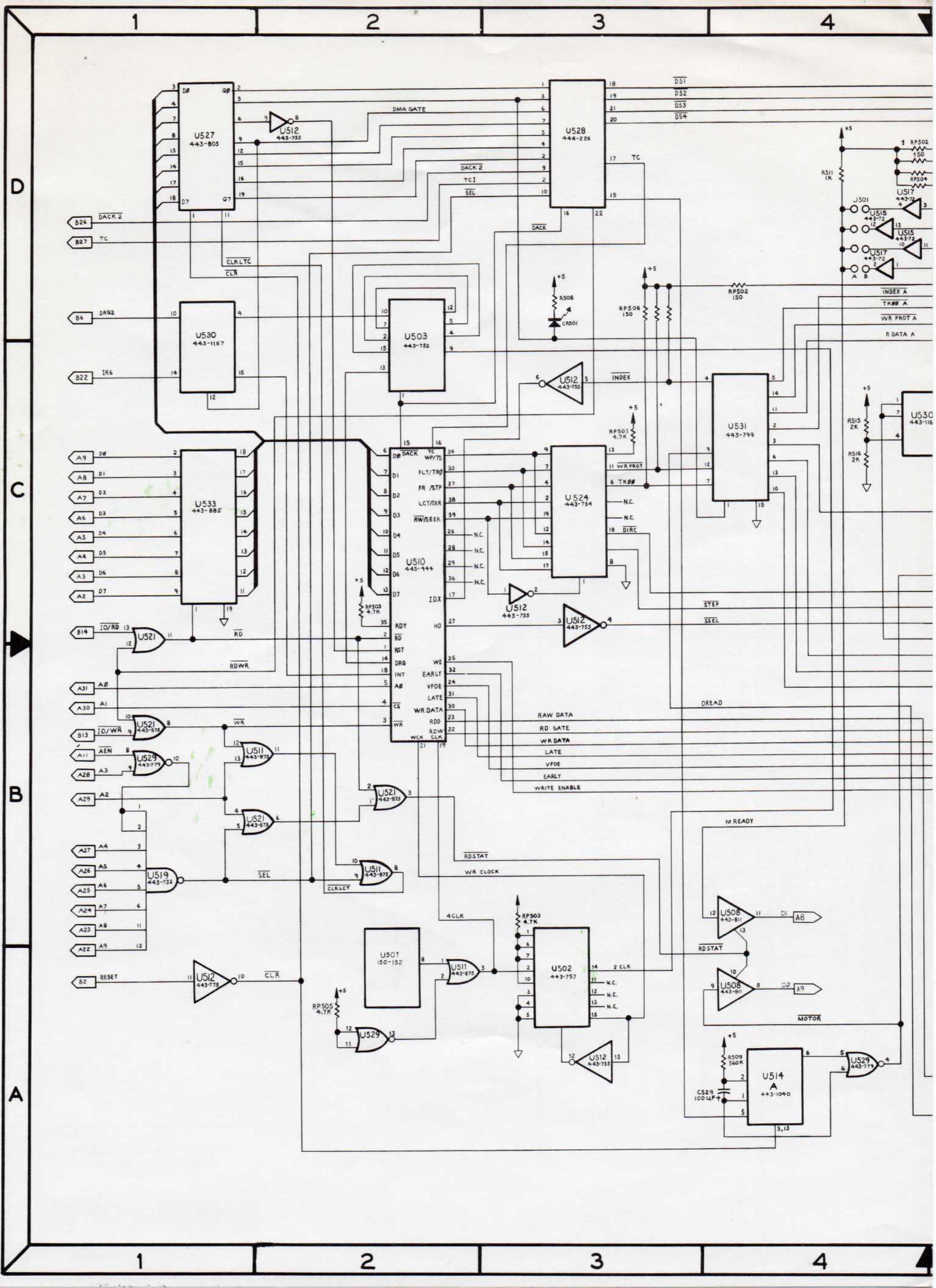
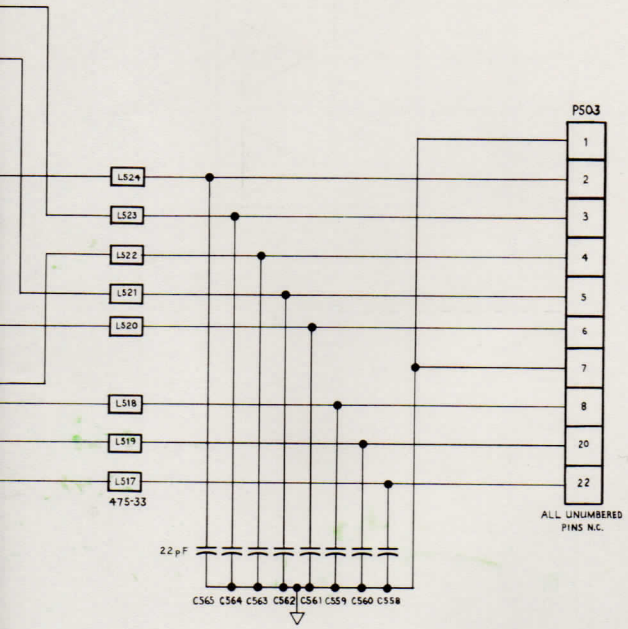
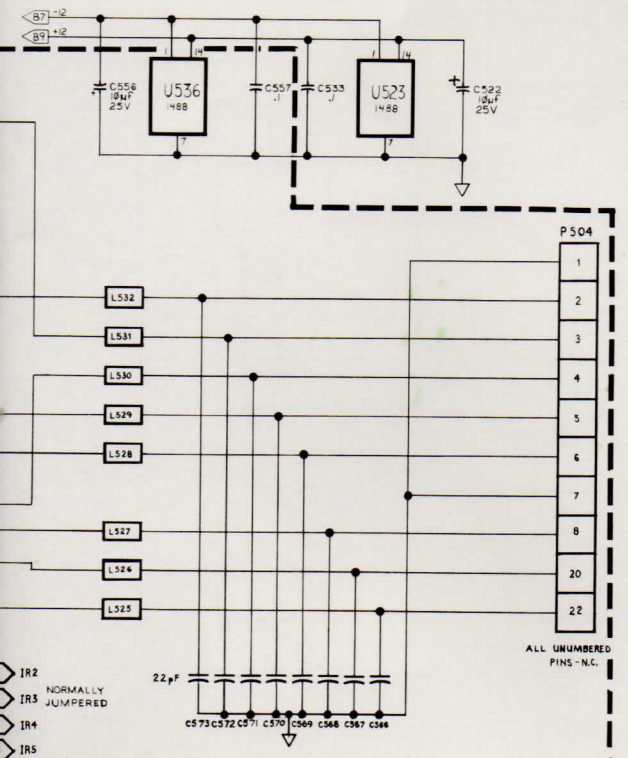

U527 443-803
U512 443-755
DMA GATE
U528 444-226
DS1
DS2
DS3
DS4
TC
DACK 2
TCI
SEL
DACK
CLK LTC
CLR
B26
B27
B6
DRQ2
B22
IR6
U530 443-1167
U503 443-752
R508
CR501
RP506 150
RP502 150
INDEX A
TK00 A
WR PROT A
R DATA A
INDEX
U531 443-799
RP503 4.7K
U533 443-885
A9
A8
A7
A6
A5
A4
A3
A2
U510 443-944
U524 443-754
WR PROT
TK00
N.C.
DIRC
STEP
SSEL
B14
IO/RD
U521 443-875
RD
RDWR
A31
A30
B13
IO/WR
A11
AEN
U529 443-779
A28
A29
WR
U511 443-875
A27
A26
A25
A24
A23
A22
U519 443-732
SEL
CLKLCT
B2
RESET
CLR
RAW DATA
RD GATE
WR DATA
LATE
VFOE
EARLY
WRITE ENABLE
DREAD
M READY
RDSTAT
WR CLOCK
4CLK
U501 150-132
RP505 4.7K
U502 443-757
2 CLK
U508 443-811
D1
A8
D2
A9
MOTOR
R509 560K
C529 100 UF
U514 A 443-1040
3,13
R511 1K
RP502 150
RP504
U501
U515 443-72
U517 443-72
R515 2K
R516 2K
U530 443-116





HEATH ZENITH

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PARTS ORDERING INFORMATION:

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443-730

For semiconductor type numbers (Example: 74LS153), refer to the "Semiconductor Identification Chart."

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FLOPPY DISK CONTROLLER CARD
SERIAL INPUT/OUTPUT

SHEET 1 OF 2

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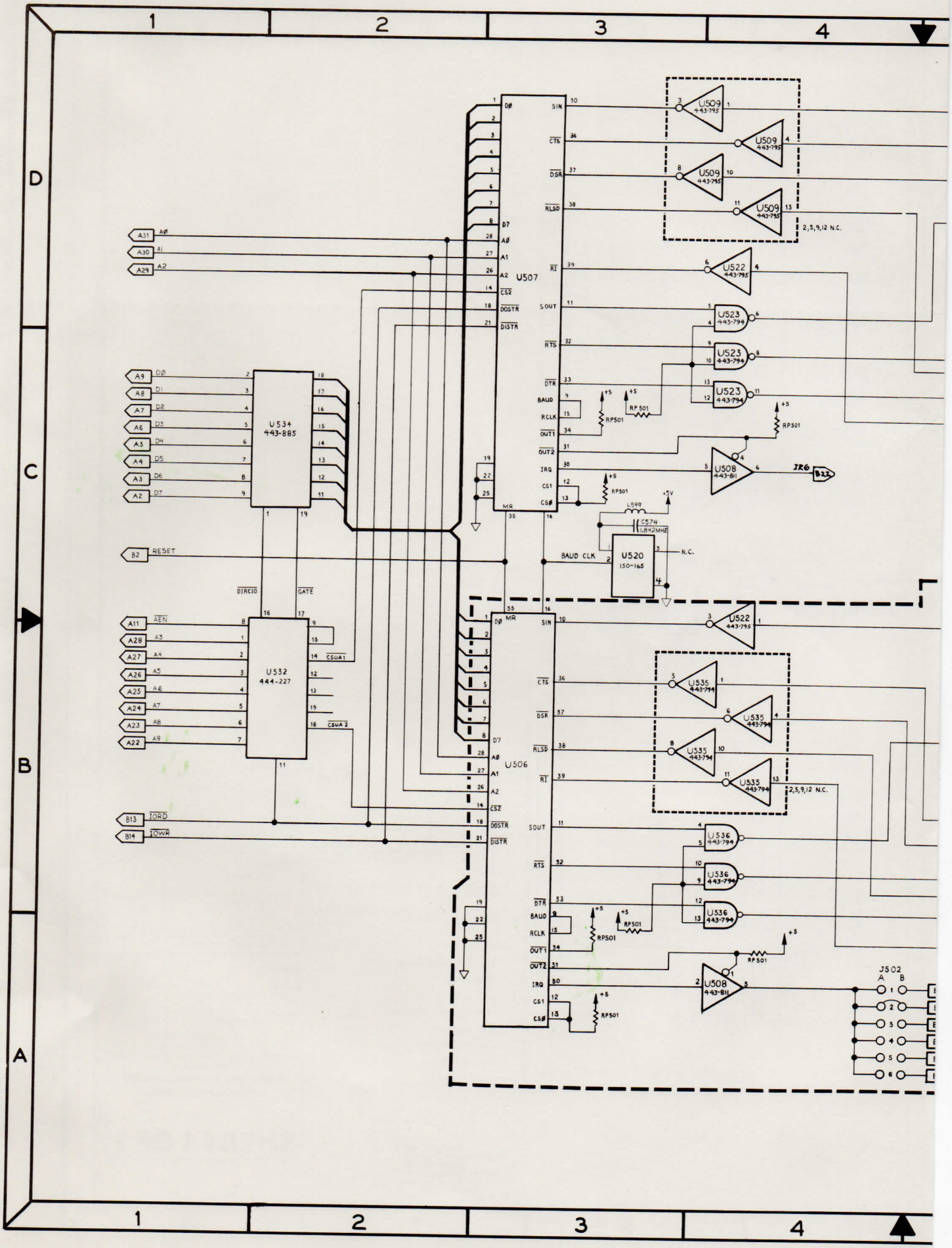
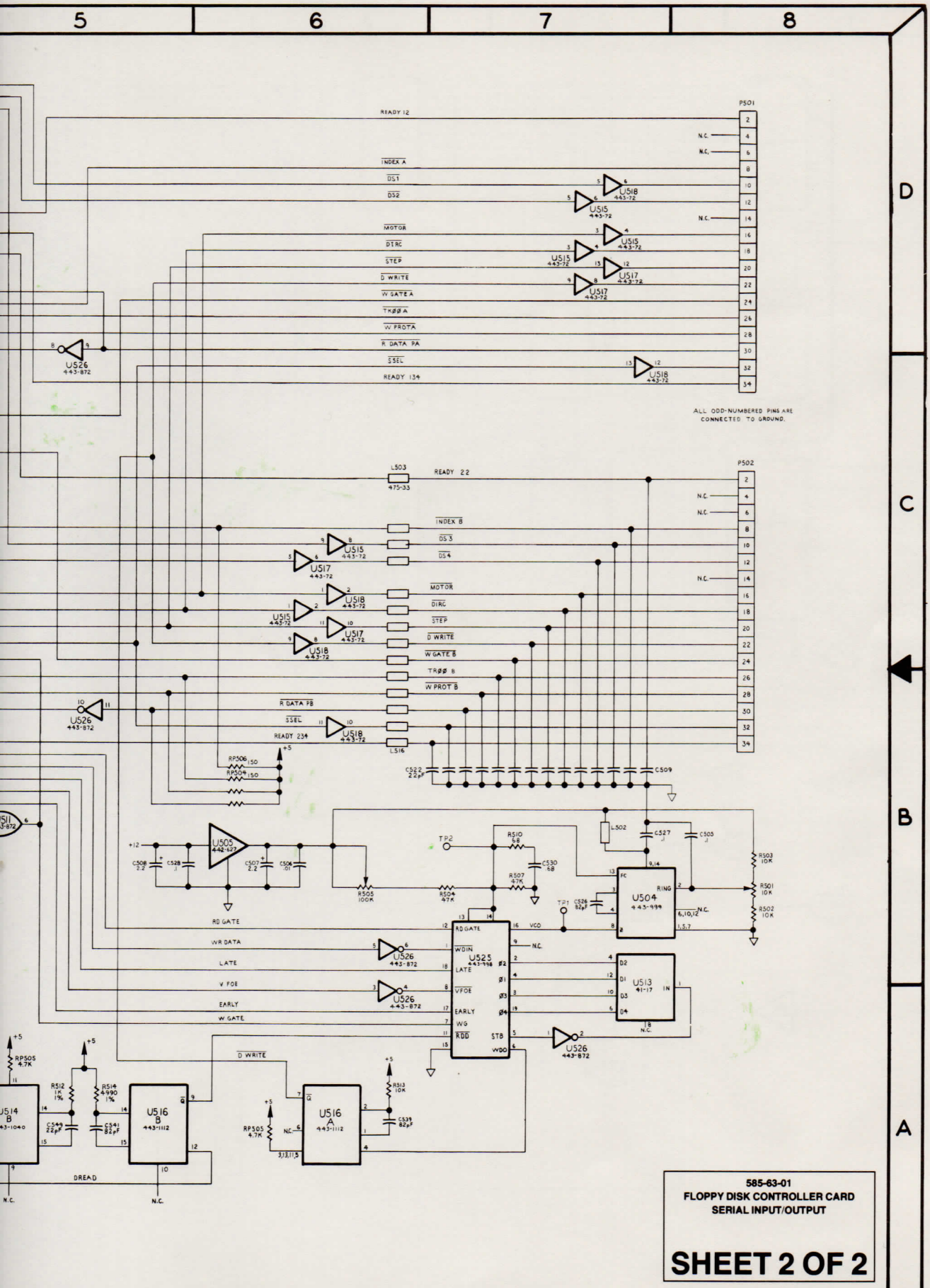


U507
U506
U534
443-885
U532
444-227
U520
150-165
U509
443-795
U522
443-795
U523
443-794
U508
443-811
U535
443-794
U536
443-794
2,5,9,12 N.C.
RP501
L599
C574
1.842MHZ
BAUD CLK
N.C.
RESET
DIRCIO
GATE
AEN
CSUA1
CSUA2
IORD
IOWR
IRQ
CS1
CSØ
DOSTR
DISTR
SIN
CTS
DSR
RLSD
RI
SOUT
RTS
DTR
BAUD
RCLK
OUT1
OUT2
MR
J502
A
B


5
6
7
8
D
C
B
A
P501
P502
READY 12
INDEX A
DS1
DS2
MOTOR
DIRC
STEP
D WRITE
W GATE A
TK00 A
W PROT A
R DATA PA
SSEL
READY 134
ALL ODD-NUMBERED PINS ARE CONNECTED TO GROUND.
L503
475-33
READY 22
INDEX B
DS3
DS4
MOTOR
DIRC
STEP
D WRITE
W GATE B
TK00 B
W PROT B
R DATA PB
SSEL
READY 234
L516
U526 443-872
U515 443-72
U517 443-72
U518 443-72
RP506 150
RP504 150
C522 22pF
C509
U505 442-427
C508 2.2
C528 .1
C507 2.2
C506 .01
R505 100K
TP2
R510 68
C530 68
R504 47K
R507 47K
L502
C527 .1
C505 .1
R503 10K
R501 10K
R502 10K
U504 443-999
RING
6,10,12 N.C.
1,5,7
TP1
C526 82pF
RD GATE
WR DATA
LATE
V FOE
EARLY
W GATE
U525 443-998
RDGATE
WDIN
LATE
VFOE
EARLY
WG
RDD
VCO
STB
VDD
U513 41-17
D1
D2
D3
D4
IN
18 N.C.
RP505 4.7K
R512 1K 1%
R514 4990 1%
C540 22pF
C541 82pF
U514 B 443-1040
U516 B 443-1112
D WRITE
DREAD
N.C.
U516 A 443-1112
R513 10K
C539 82pF
3/3/115
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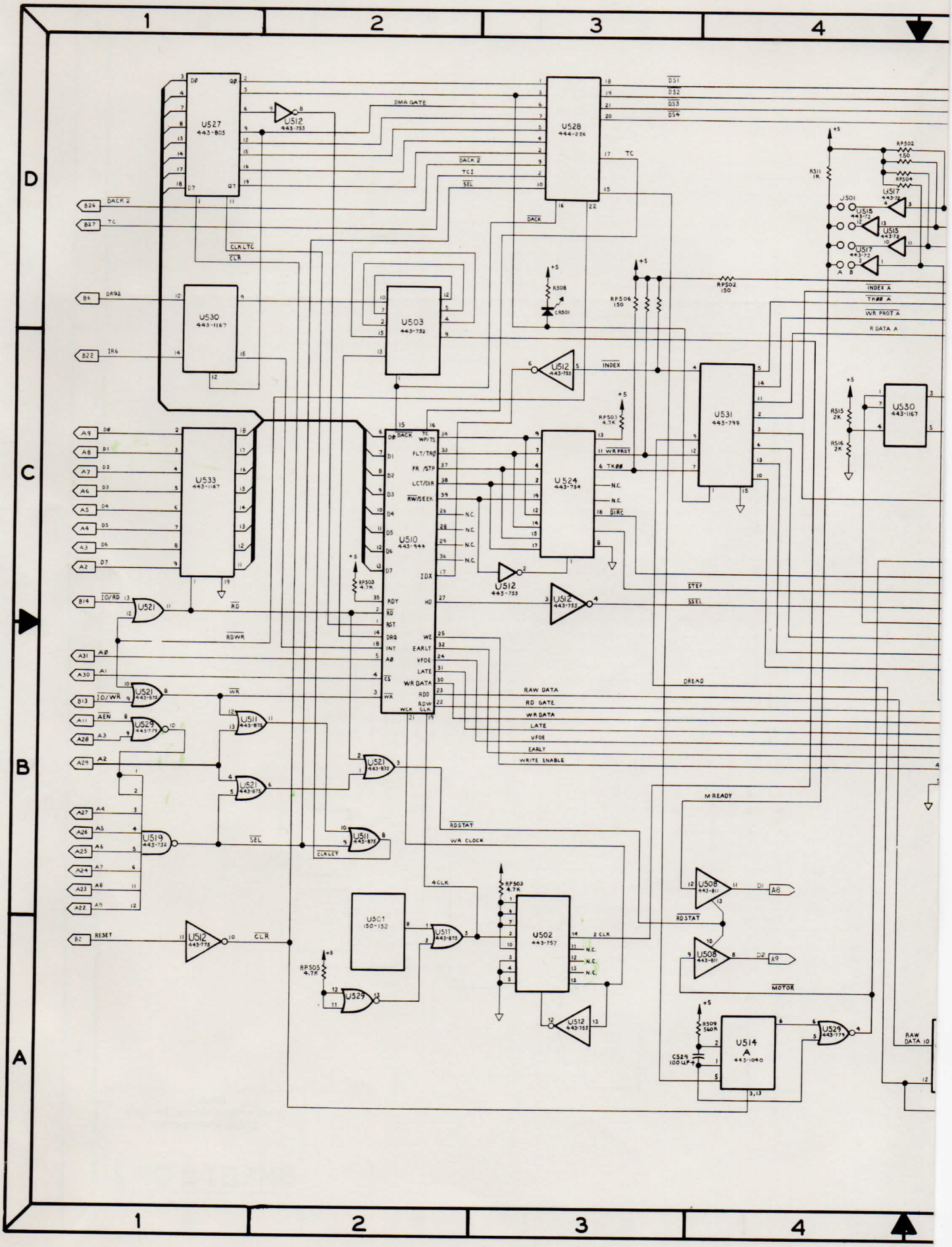
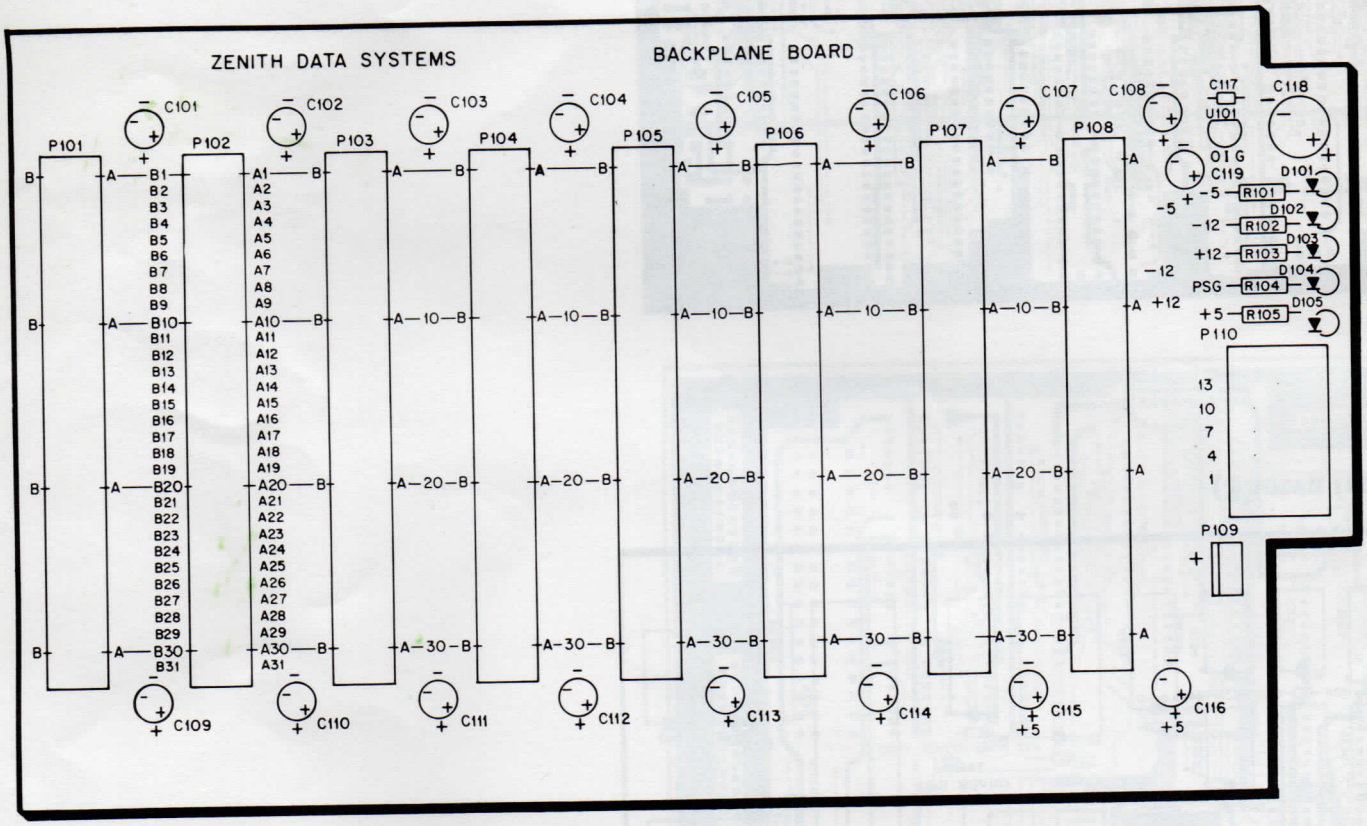
FLOPPY DISK CONTROLLER CARD
SERIAL INPUT/OUTPUT
SHEET 2 OF 2



U527 443-805
U528 444-226
U530 443-1167
U503 443-752
U533 443-1167
U510 443-944
U524 443-754
U531 443-799
U530 443-1167
U501 150-152
U502 443-757
U514 A 443-1040
DMA GATE
DACK 2
TC
SEL
CLKLTC
CLR
DRQ2
IR6
INDEX
INDEX A
TKØØ A
WR PROT A
R DATA A
STEP
SSEL
DREAD
RAW DATA
RD GATE
WR DATA
LATE
VFOE
EARLY
WRITE ENABLE
M READY
RDSTAT
WR CLOCK
4CLK
2 CLK
MOTOR
RESET
IO/RD
IO/WR
RD
RDWR
WR
AEN
RAW DATA

ILLUSTRATIO

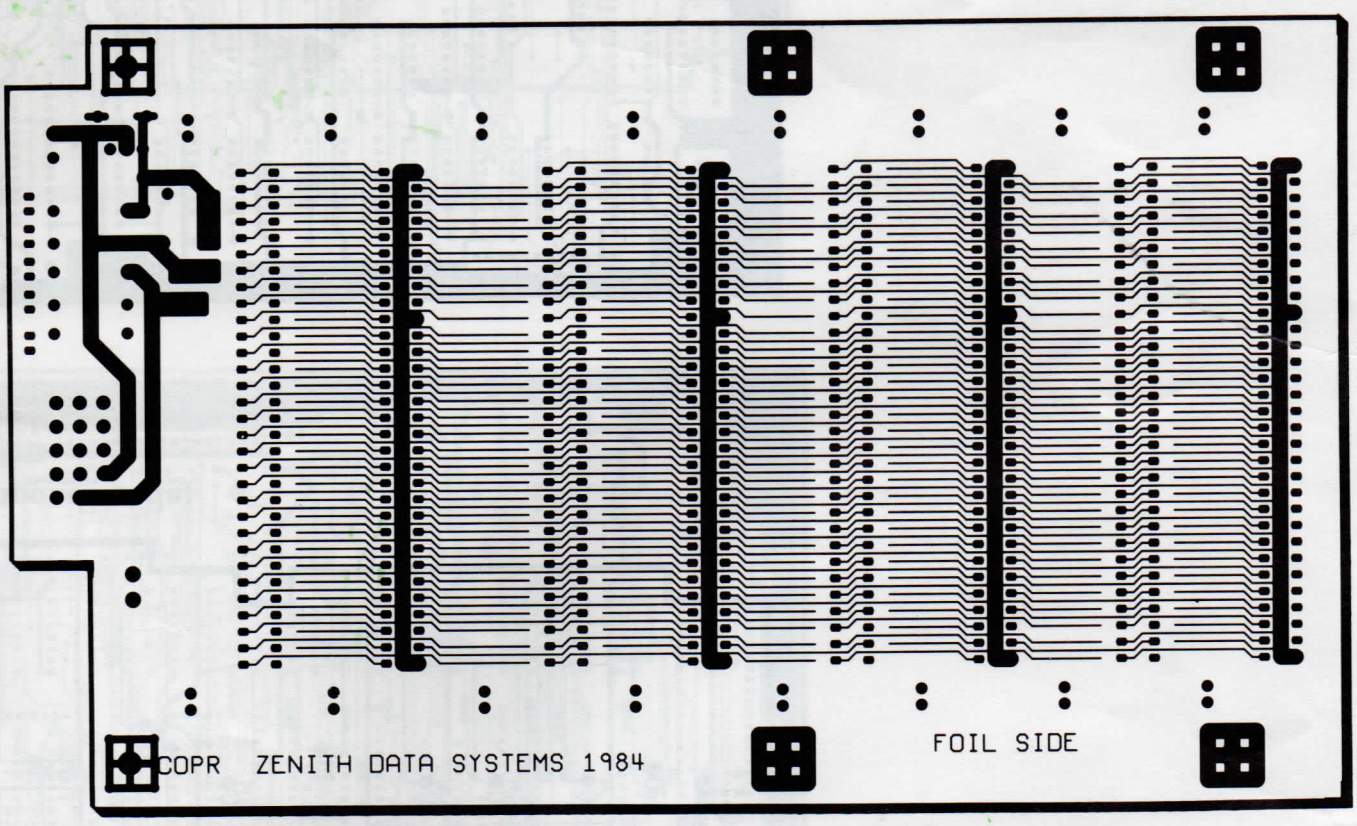


(Shown from the component side)

BACKPLANE C

ON BOOKLET

Part of 597-3658



(Shown from the foil side)

RCUIT BOARD

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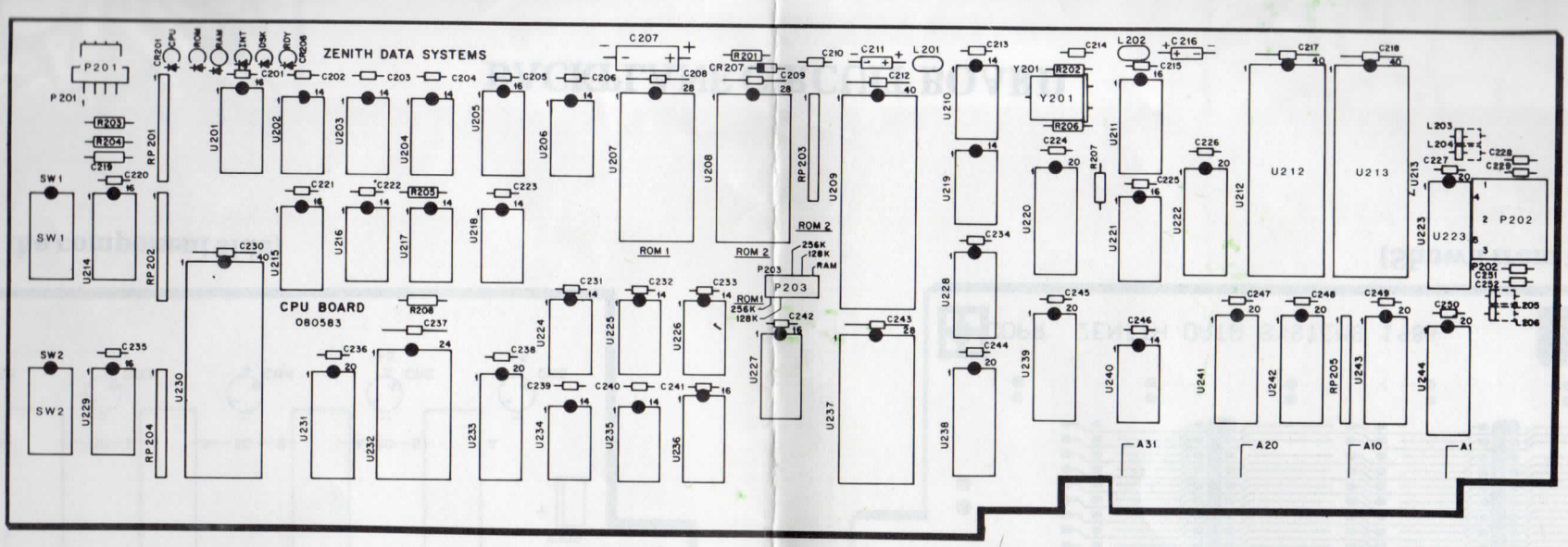

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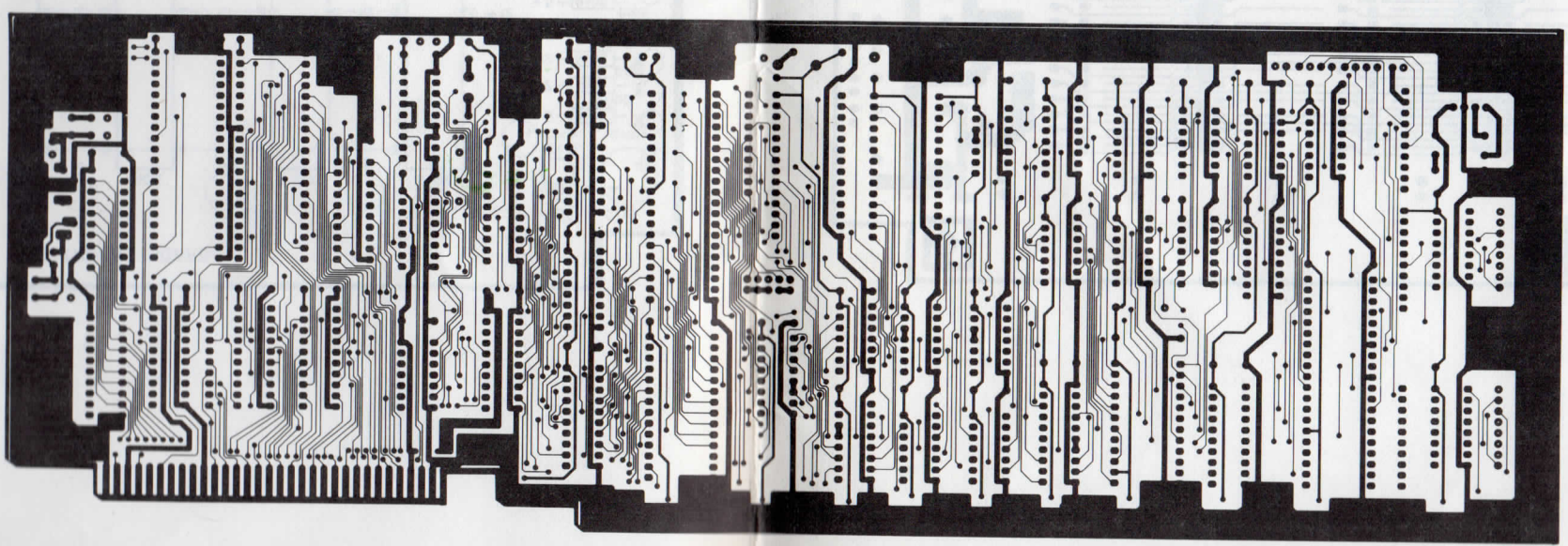
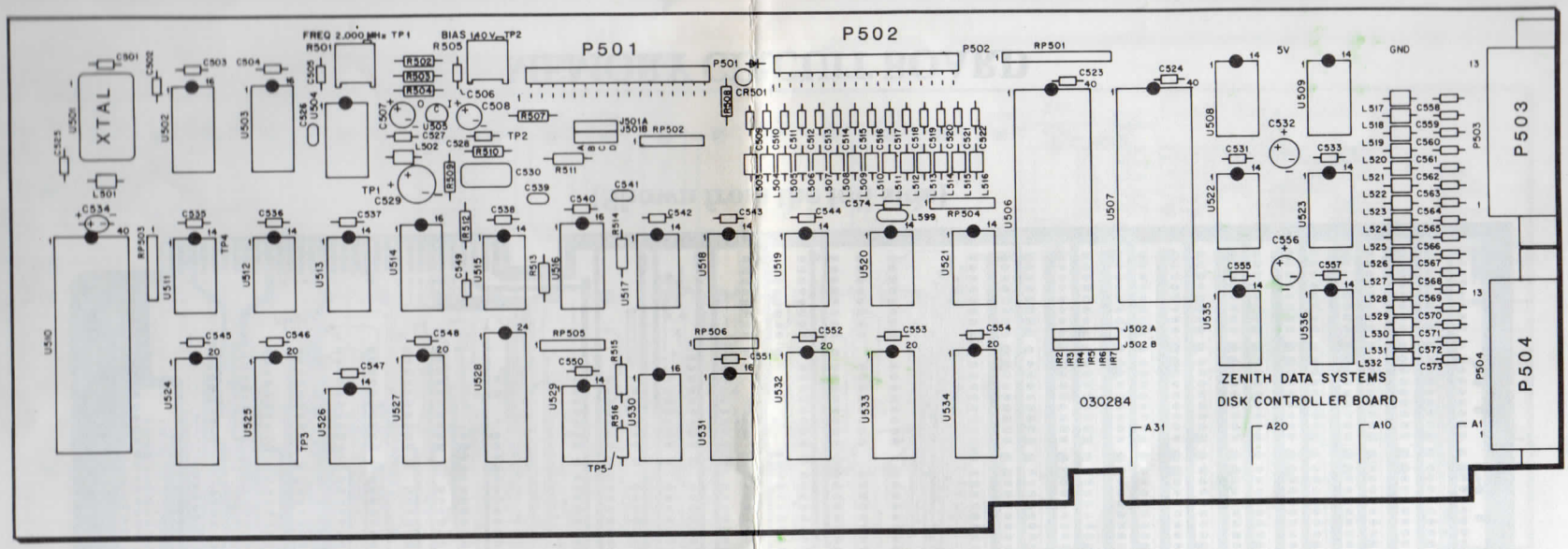


(Shown from the foil side)

CPU CIRCUIT BOARD



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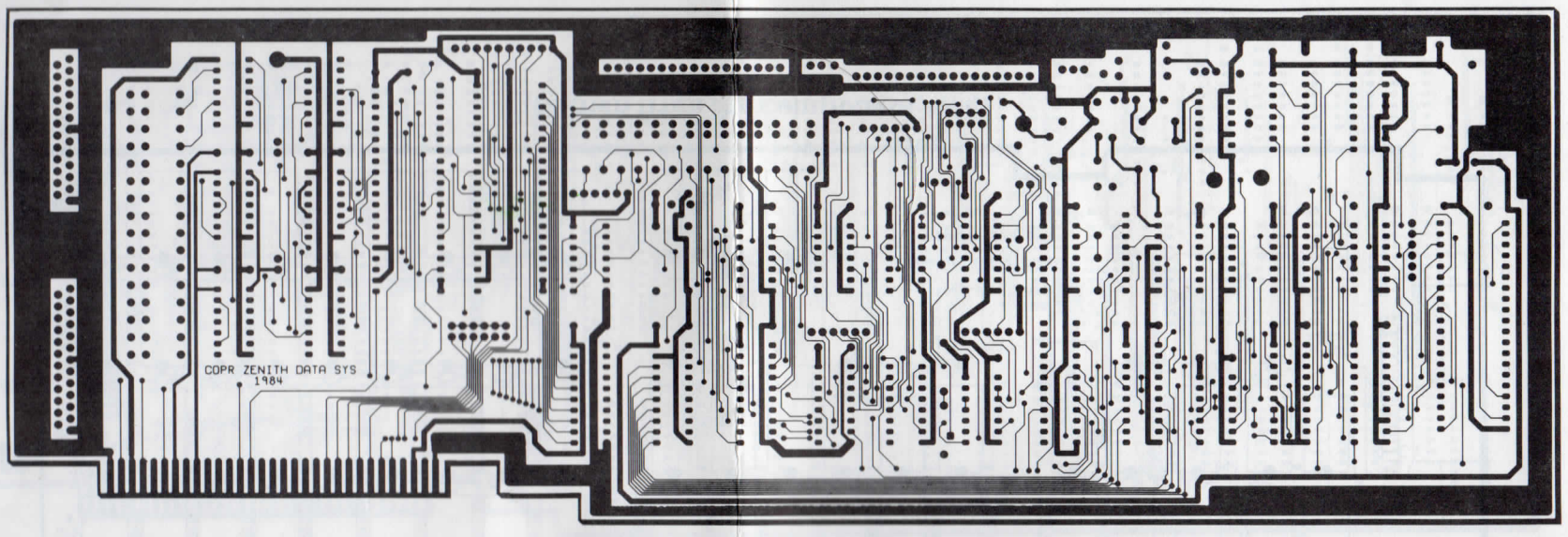
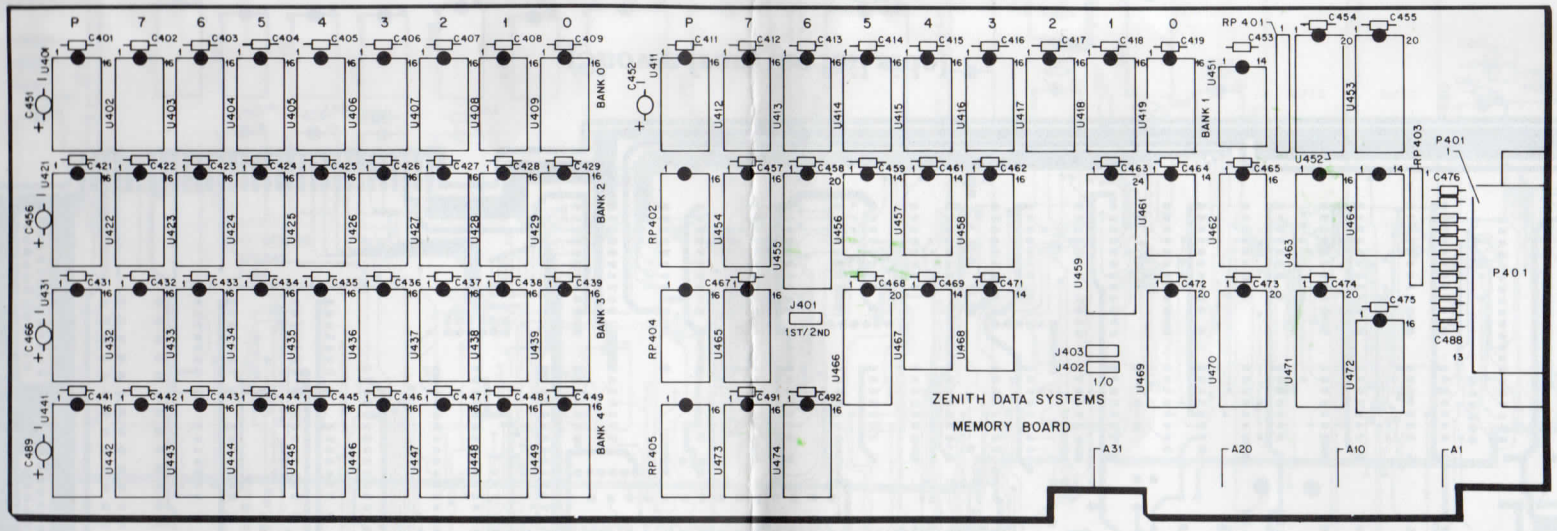


(Shown from the foil side)

DISK CONTROLLER CIRCUIT BOARD



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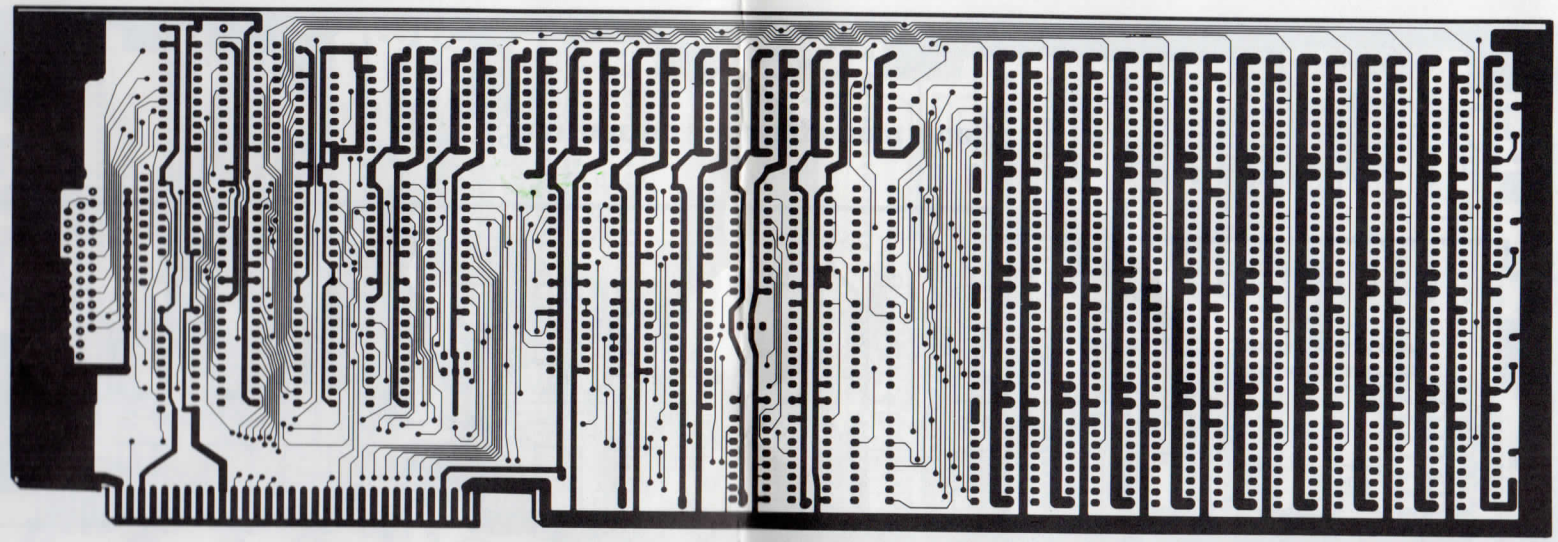
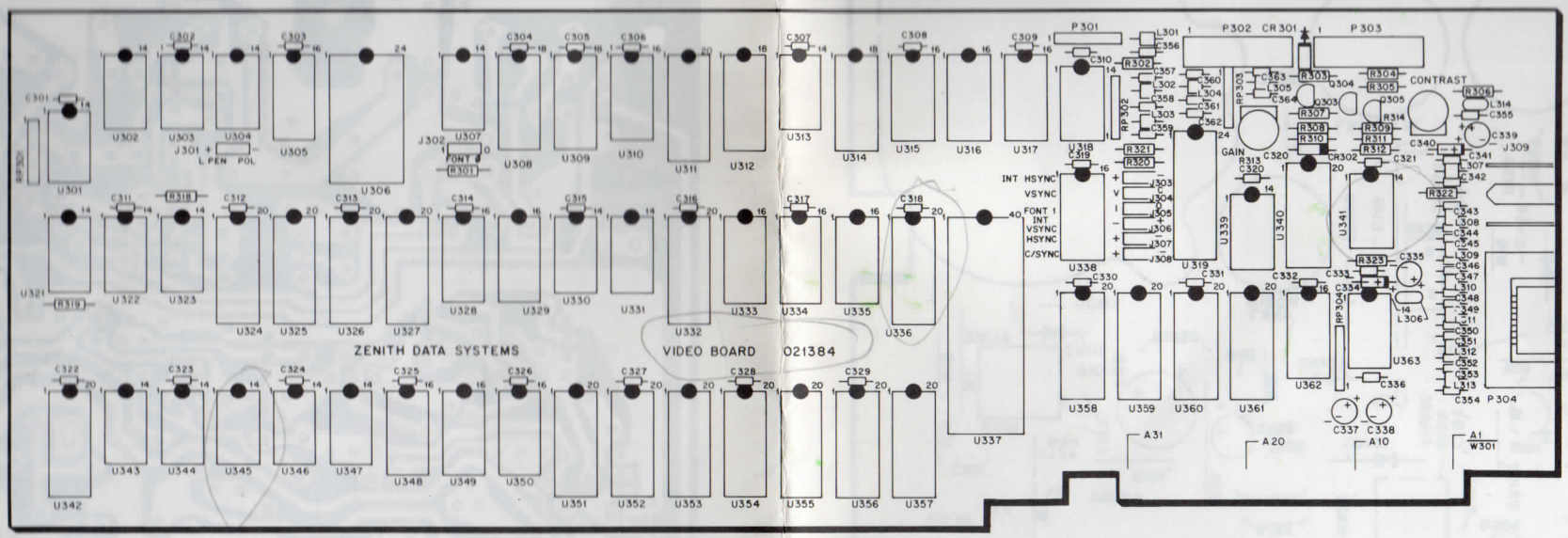


(Shown from the foil side)

MEMORY CIRCUIT BOARD



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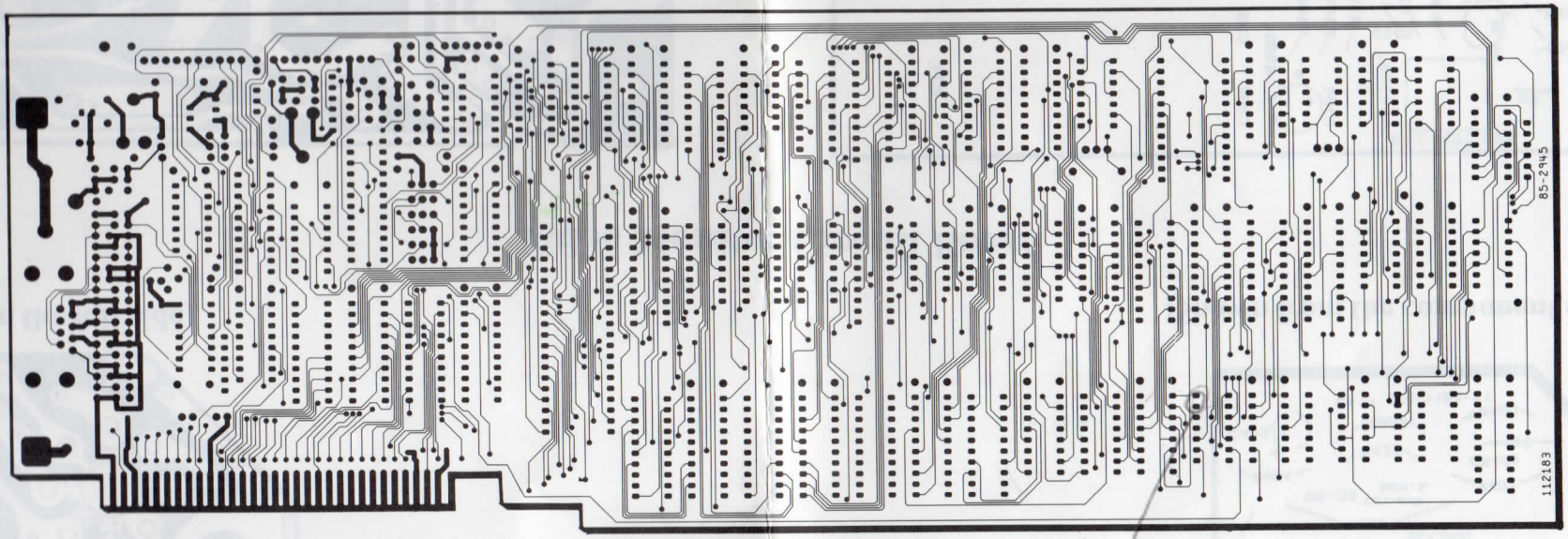
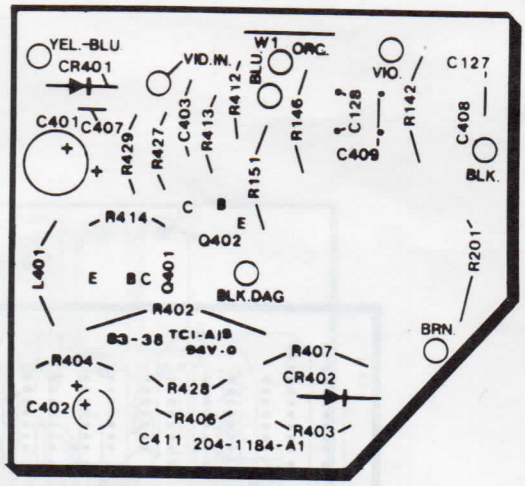


(Shown from the foil side)

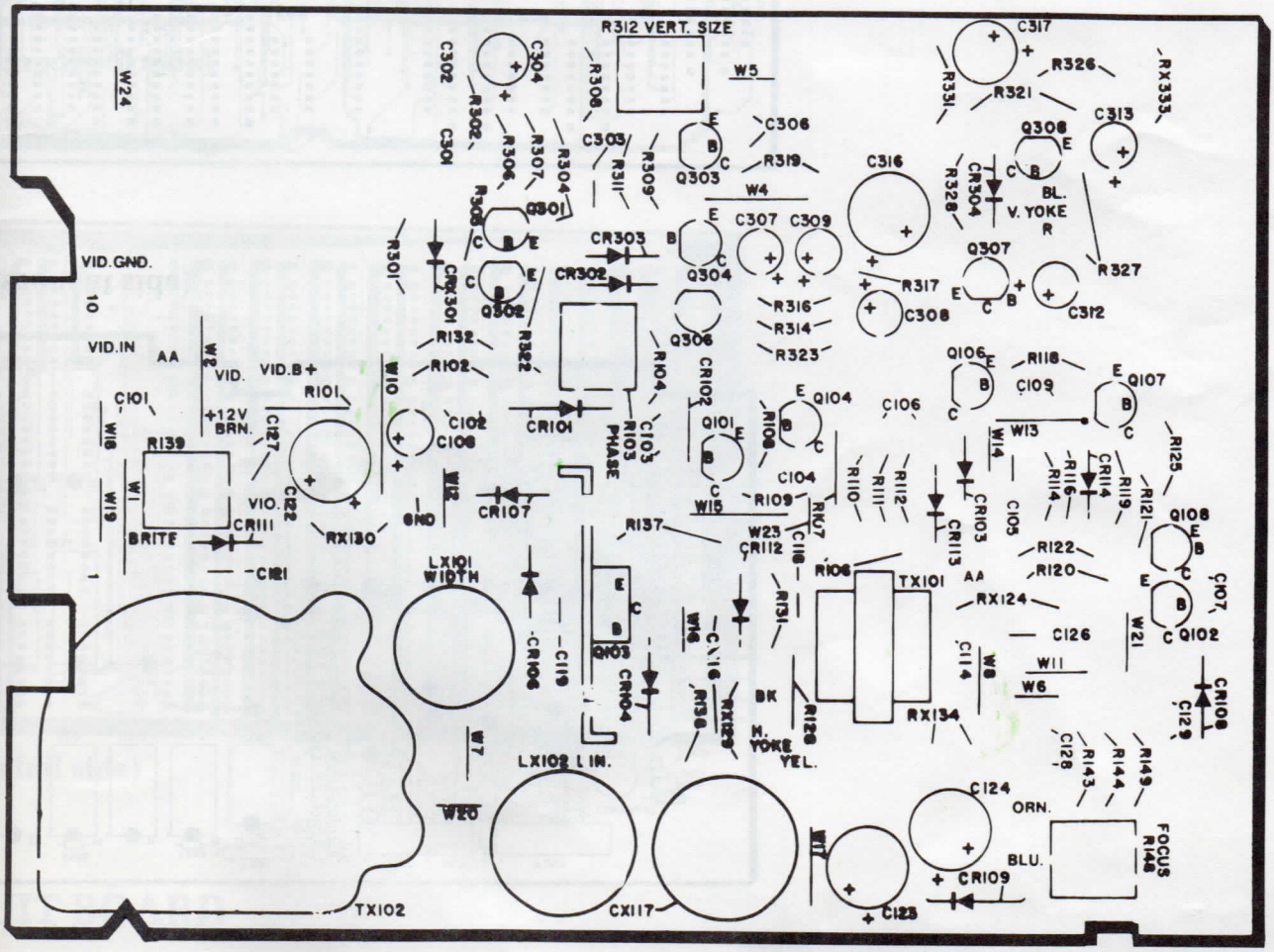
COLOR VIDEO CIRCUIT BOARD

Circuit Board



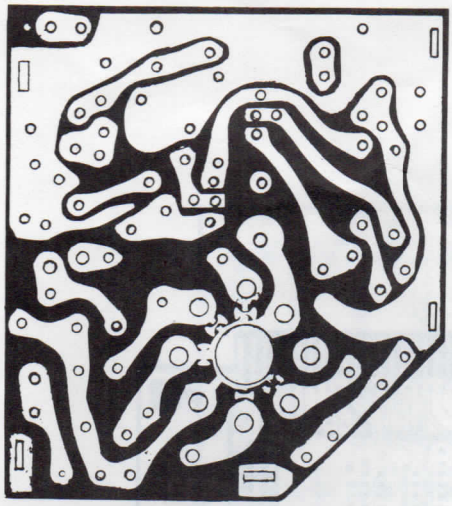
(Shown from the component side)

Circuit Board



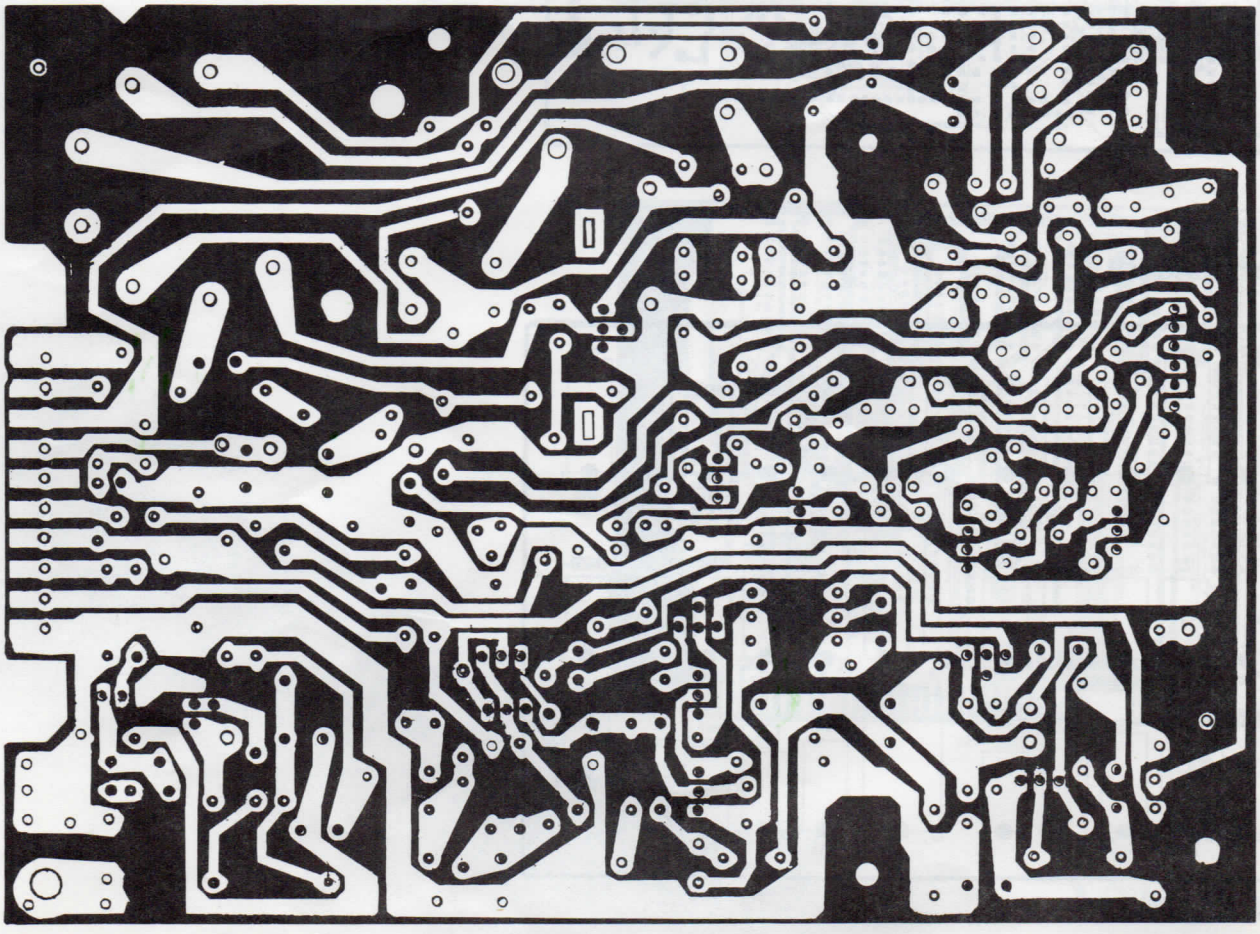
(Shown from the component side)

Video Driver



(Shown from the foil side)

Video Monito



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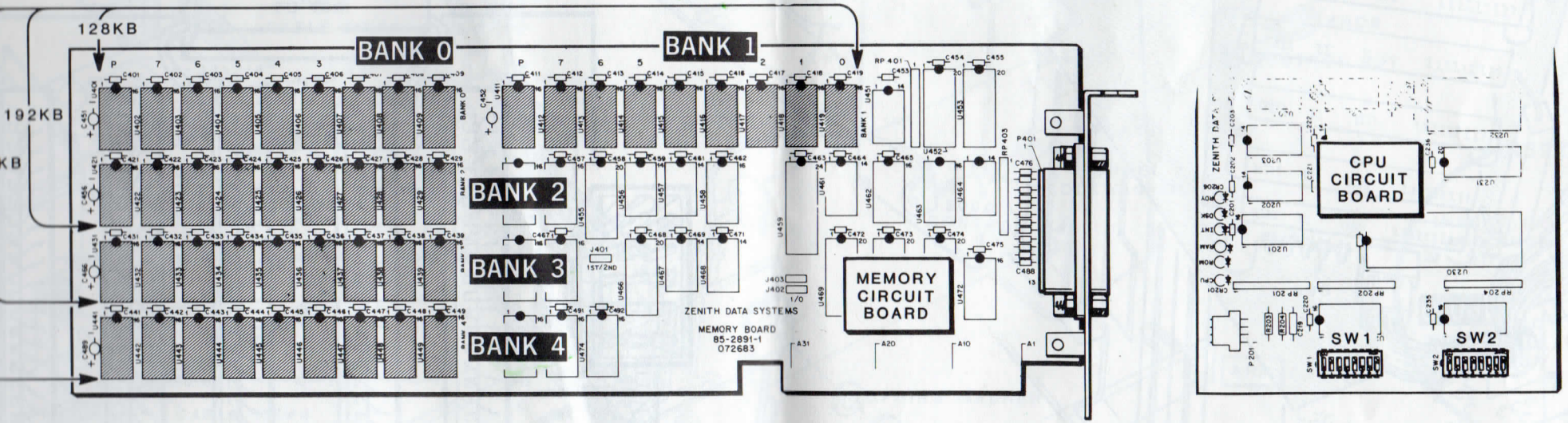


PICTORIAL 7-3

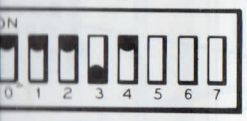
WITCHES

SW2

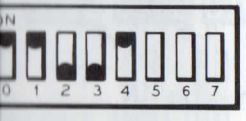
SW2

SW2

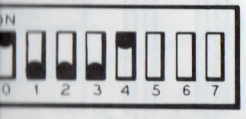
SW2



SW2



SW2

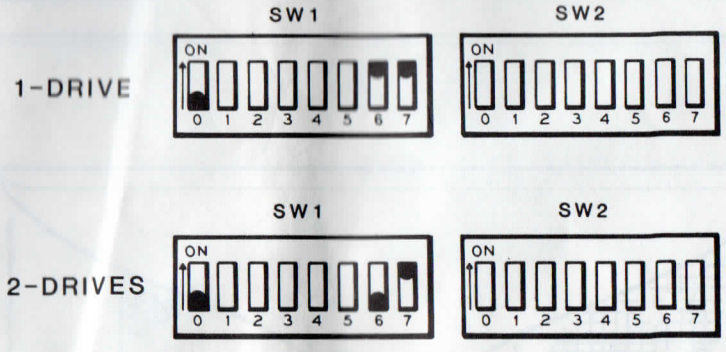


SW2

SW2

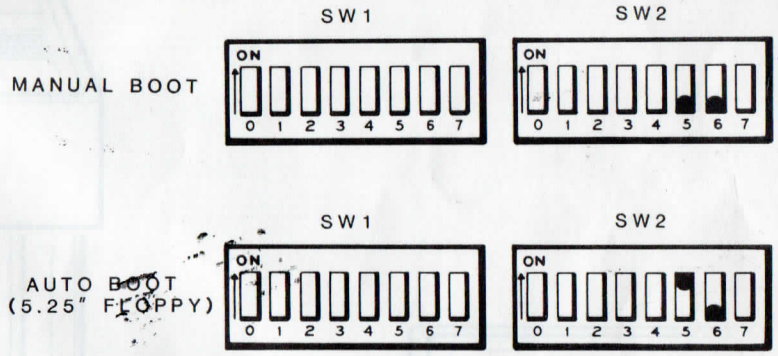
DRIVE CONFIGURATION

NUMBER OF 5-1/4" DISKETTE DRIVES INSTALLED



Detail 7-3B

BOOT CONFIGURATION



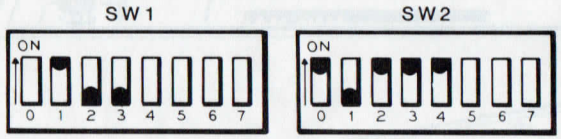
Detail 7-3C

MEMORY CONFIGURATION

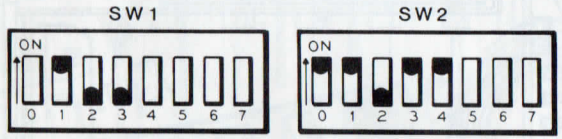
CPU BOARD SWITCHES

MEMORY OPTIONS

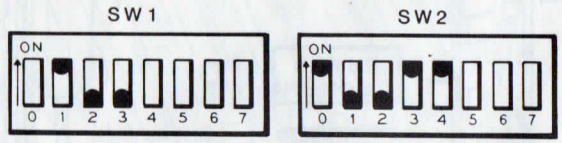
128K



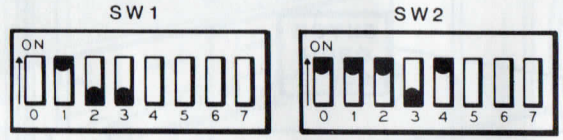
192K



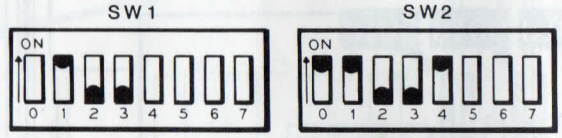
256K



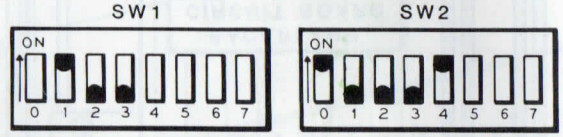
320K



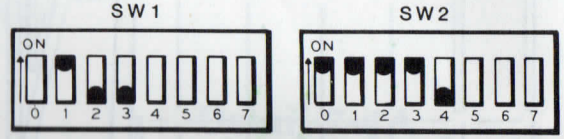
448K



512K



576K



DRIVE CONFIGURATION

NUMBER OF 5-1/4" DISKETTE DRIVES INSTALLED

1-DRIVE

2-DRIVES

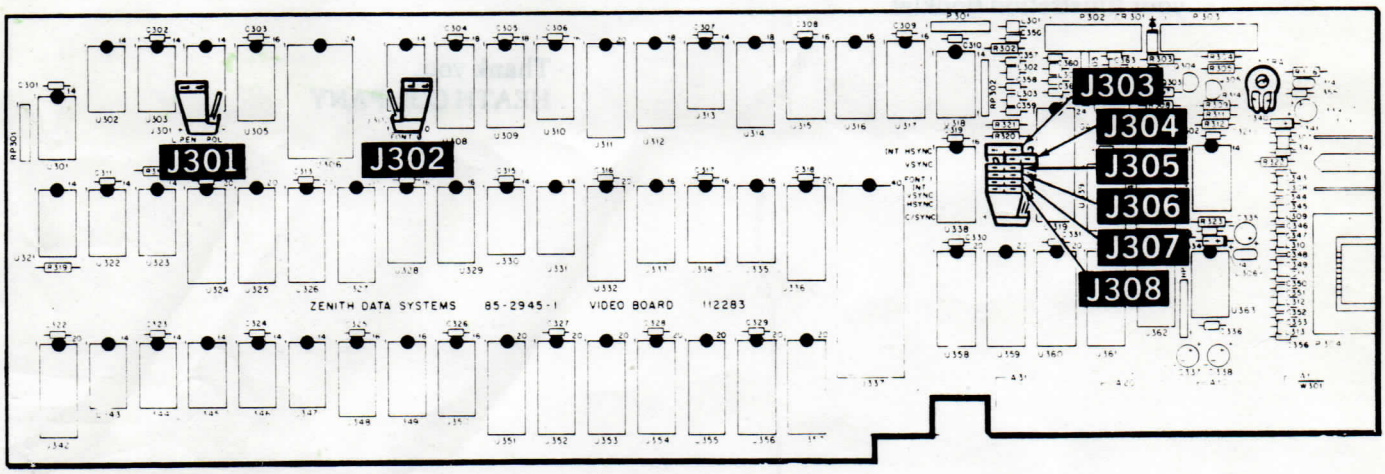
Detail 7-3B

BOO

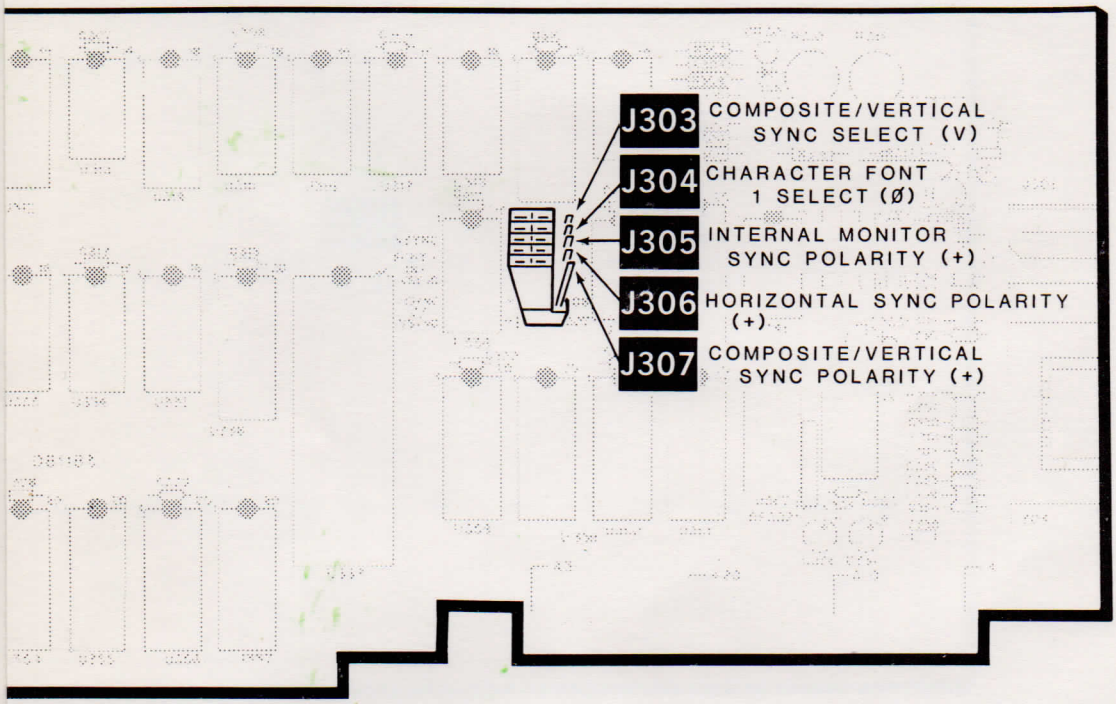
MANUAL BOO

AUTO BOOT
(5.25" FLOPPI

VIDEO BOARD SYNC JUMPER CONFIGURATION



PICTORIAL 7-9



eo Card Jumper Locations

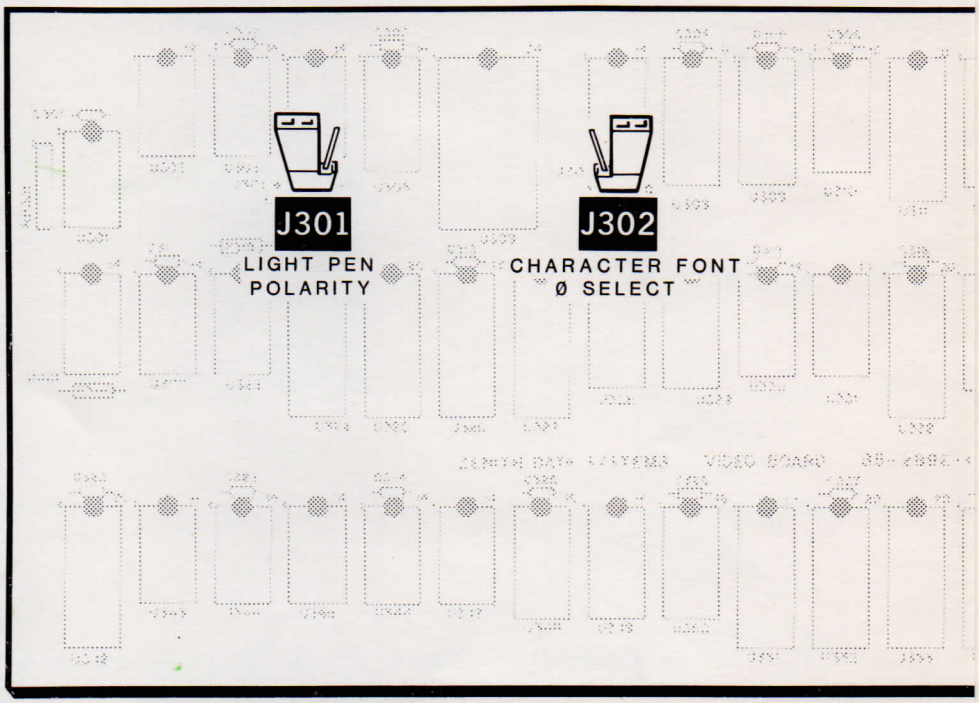
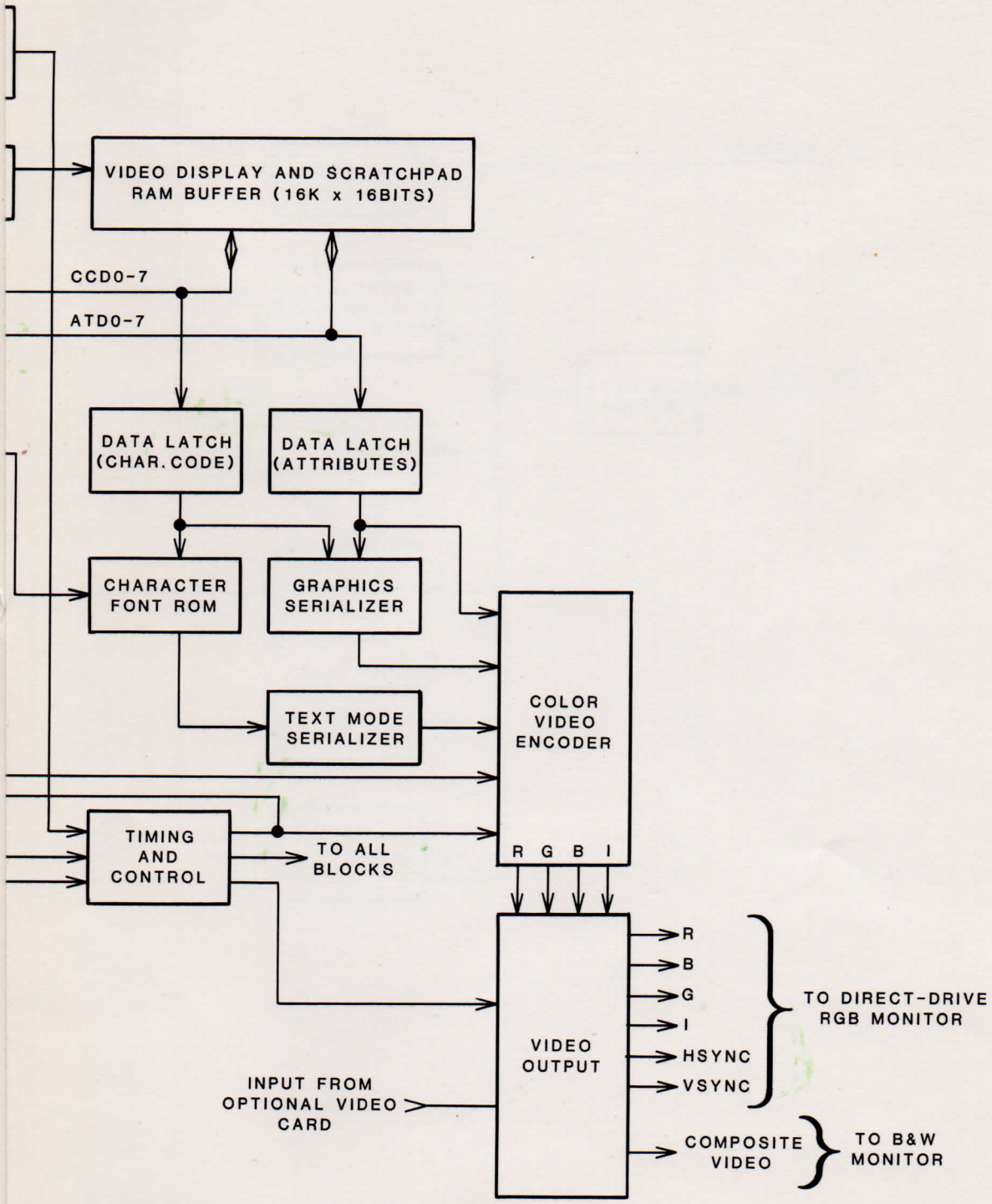


Figure 9.1. Vid



eo Interface Block Diagram

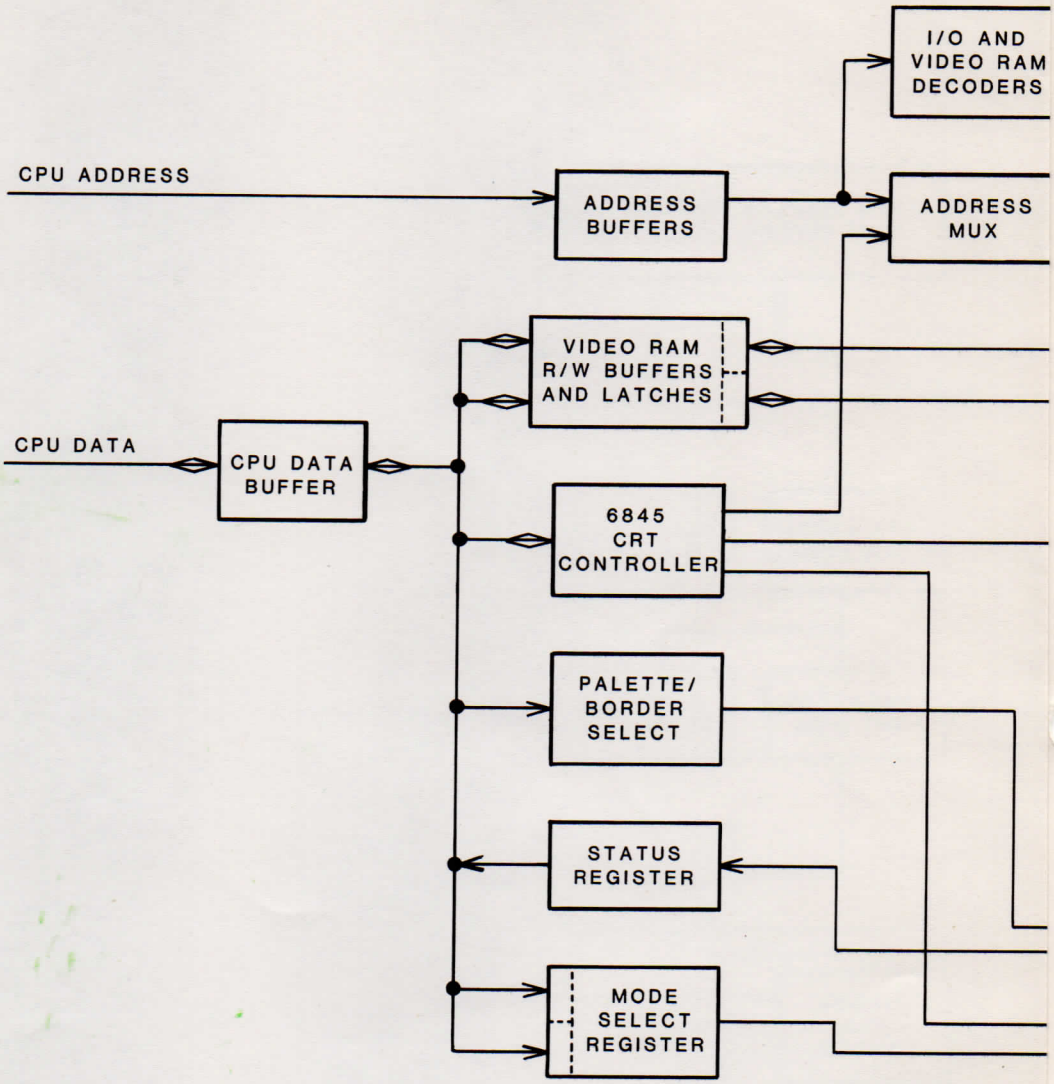
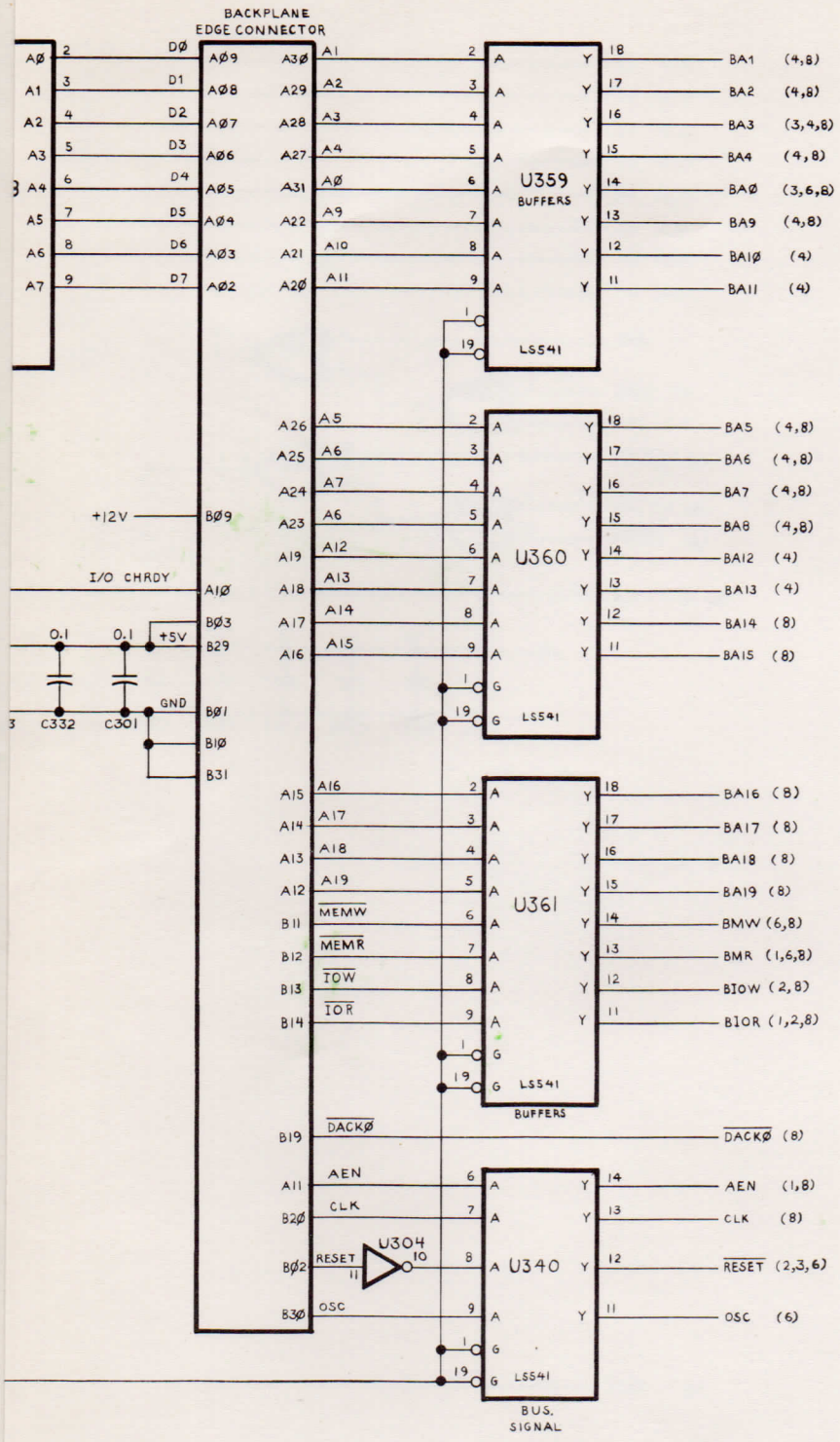


Figure 9.2. Vid



Bus Interface Circuits

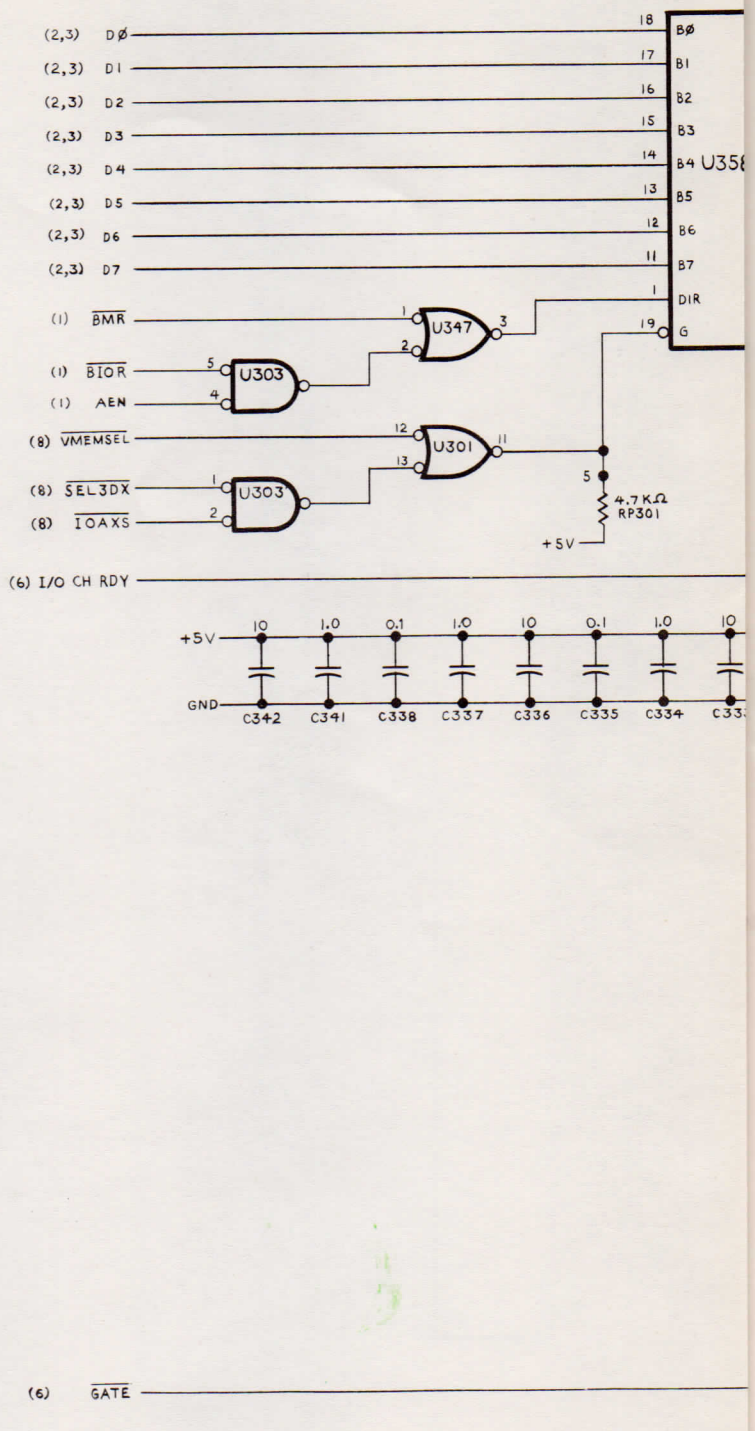
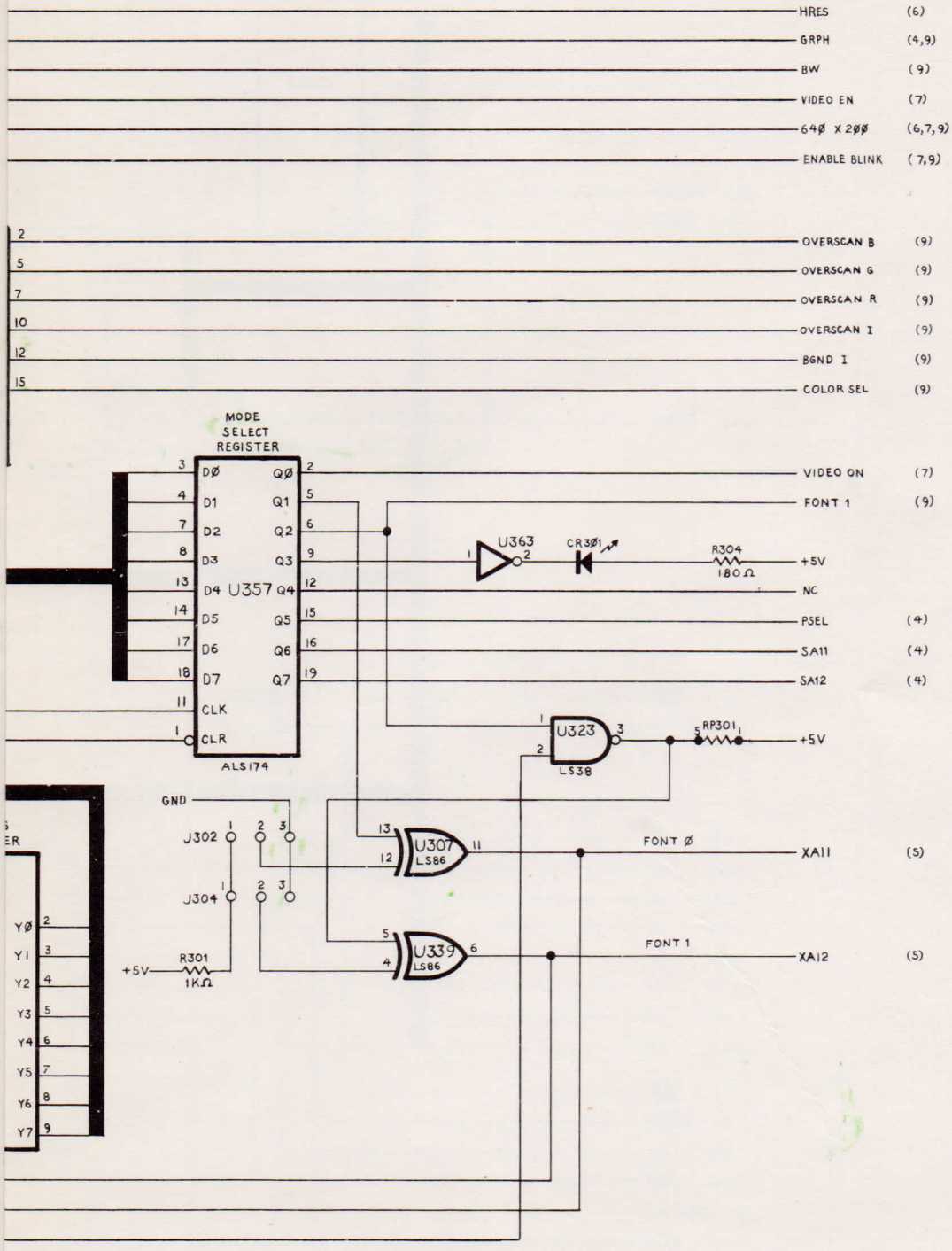
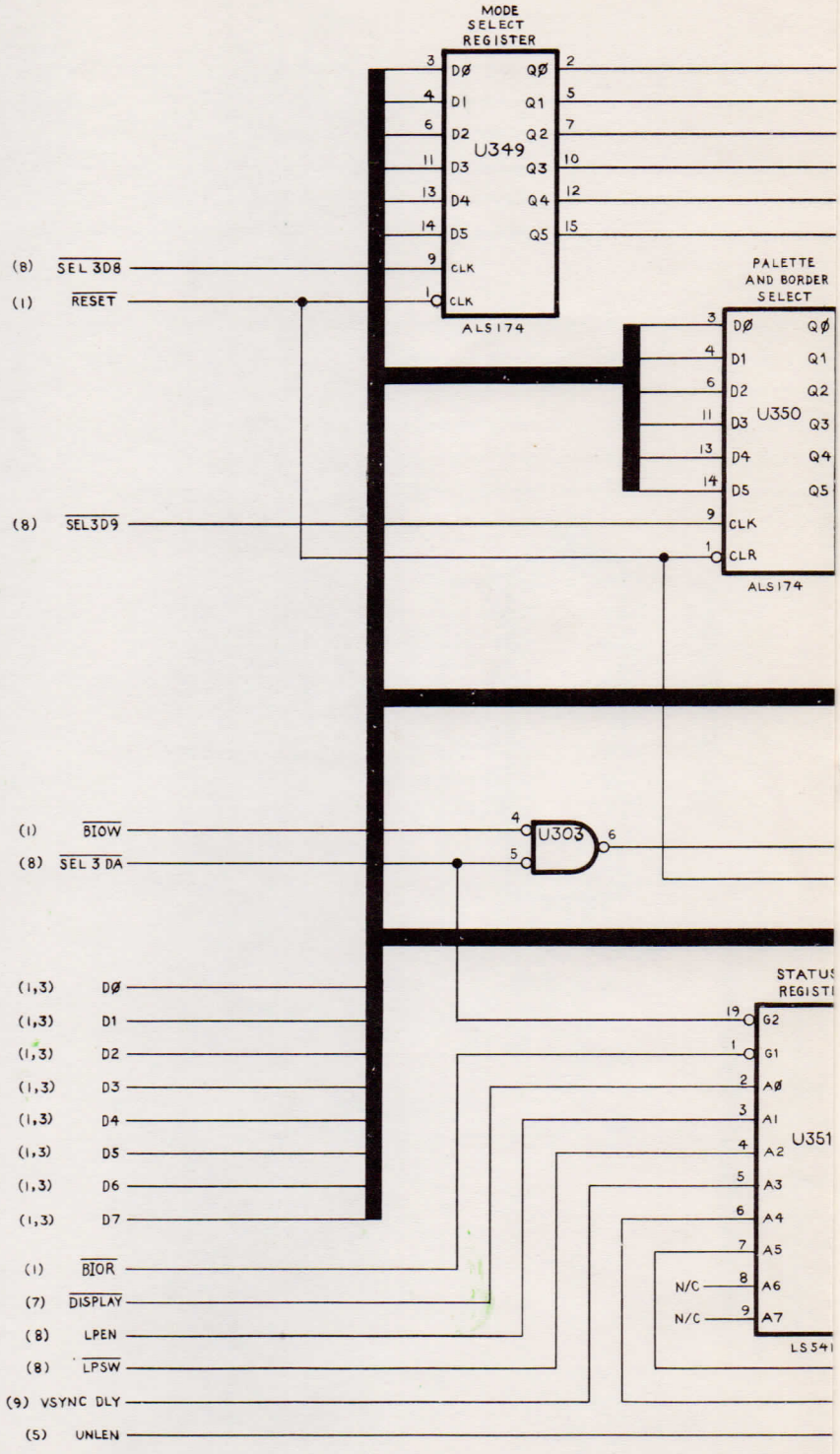

(2,3) DØ
(2,3) D1
(2,3) D2
(2,3) D3
(2,3) D4
(2,3) D5
(2,3) D6
(2,3) D7
18 BØ
17 B1
16 B2
15 B3
14 B4 U35
13 B5
12 B6
11 B7
1 DIR
19 G
(1) BMR
(1) BIOR
(1) AEN
U347
U303
(8) VMEMSEL
(8) SEL3DX
(8) IOAXS
U301
U303
4.7 KΩ
RP301
+5V
(6) I/O CH RDY
+5V
GND
10
1.0
0.1
1.0
10
0.1
1.0
10
C342
C341
C338
C337
C336
C335
C334
(6) GATE

Figure 9.3.



9.4. Video I/O Ports


MODE SELECT REGISTER
U349
ALS174
PALETTE AND BORDER SELECT
U350
ALS174
U303
STATUS REGISTER
U351
LS541
(8) SEL 3D8
(1) RESET
(8) SEL3D9
(1) BIOW
(8) SEL 3 DA
(1,3) D0
(1,3) D1
(1,3) D2
(1,3) D3
(1,3) D4
(1,3) D5
(1,3) D6
(1,3) D7
(1) BIOR
(7) DISPLAY
(8) LPEN
(8) LPSW
(9) VSYNC DLY
(5) UNLEN
N/C
N/C

Figure

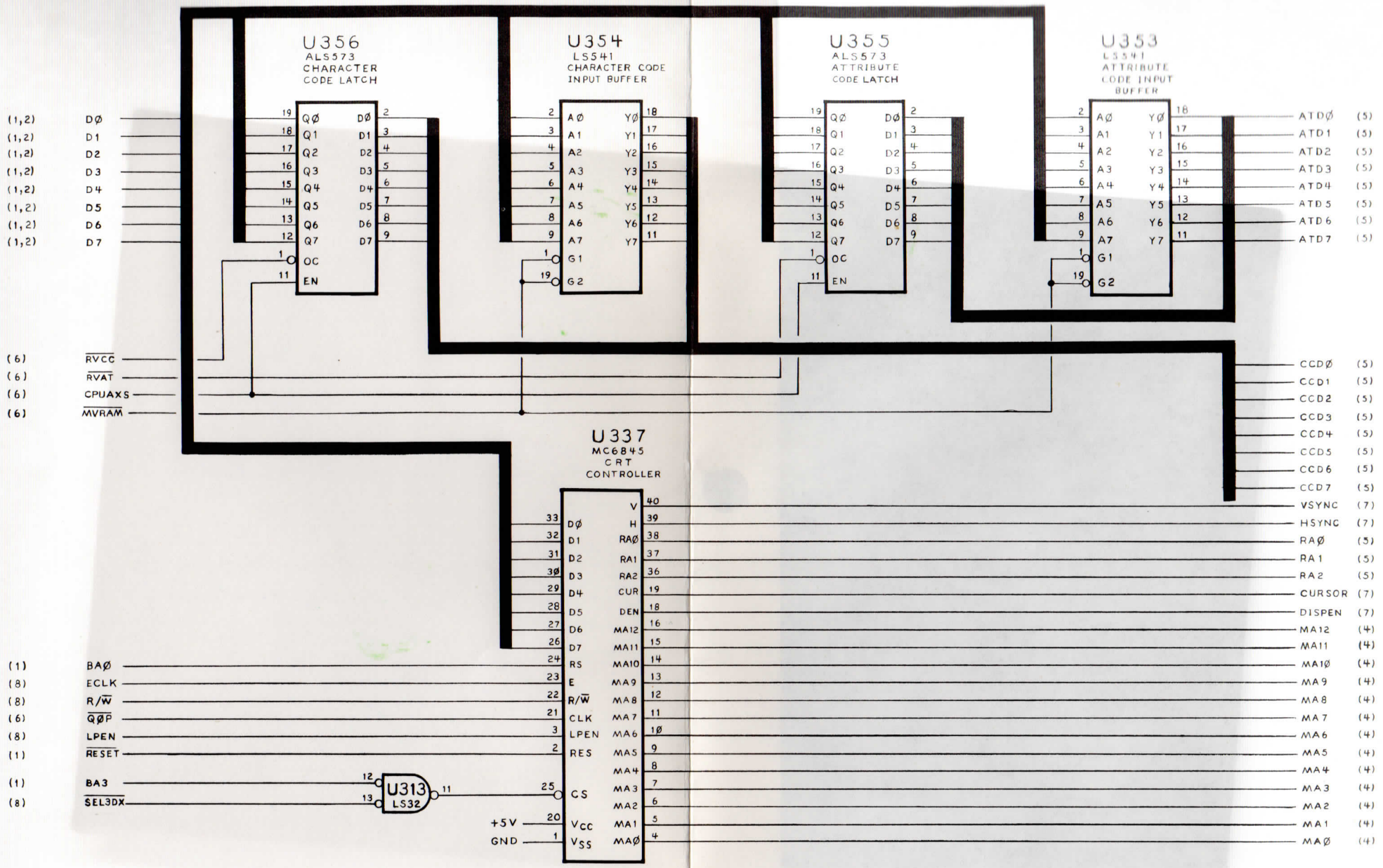


Figure 9.5. CRT Controller, Buffers, and Latches

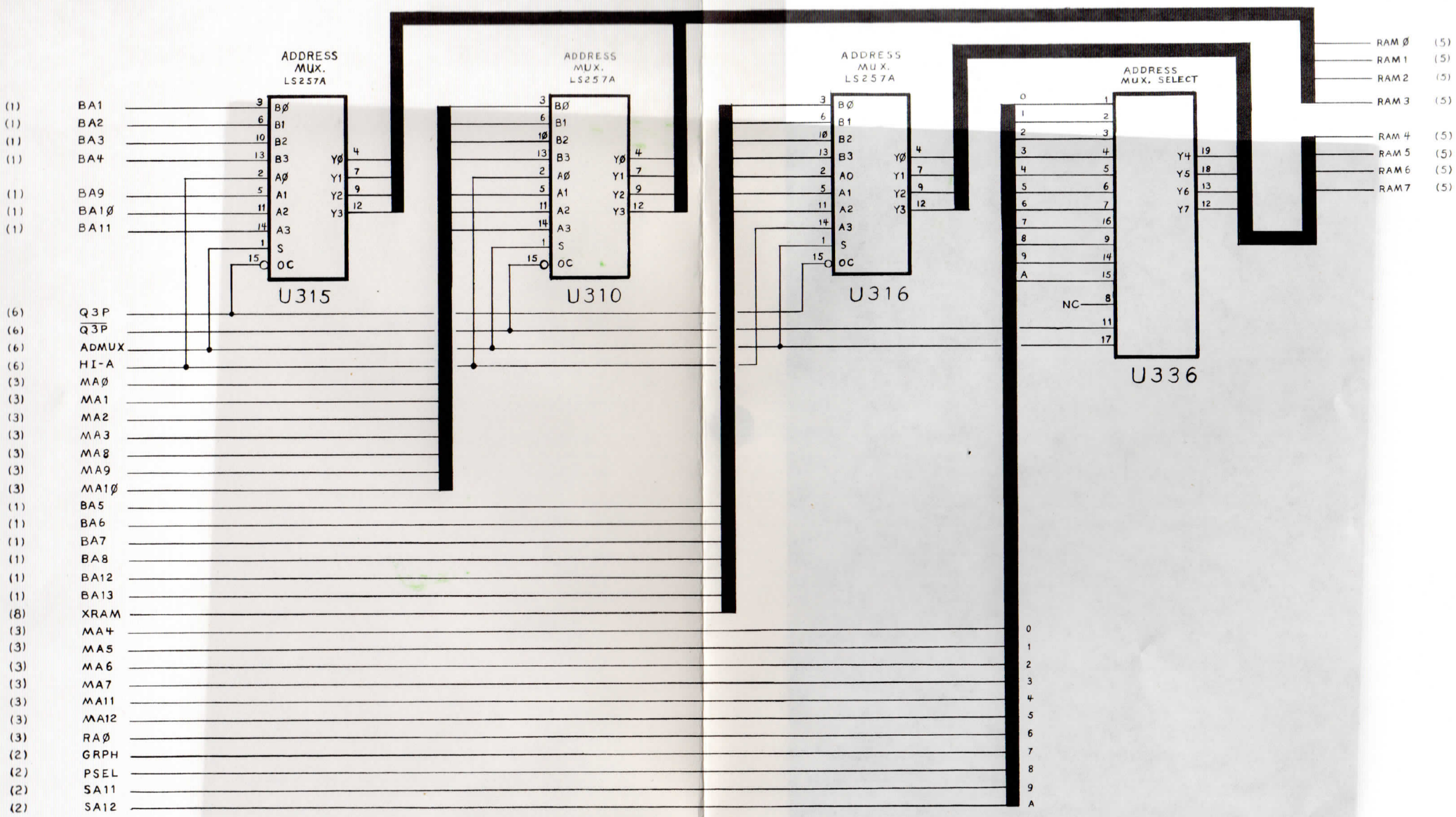


Figure 9.6. Video RAM Address Multiplexers

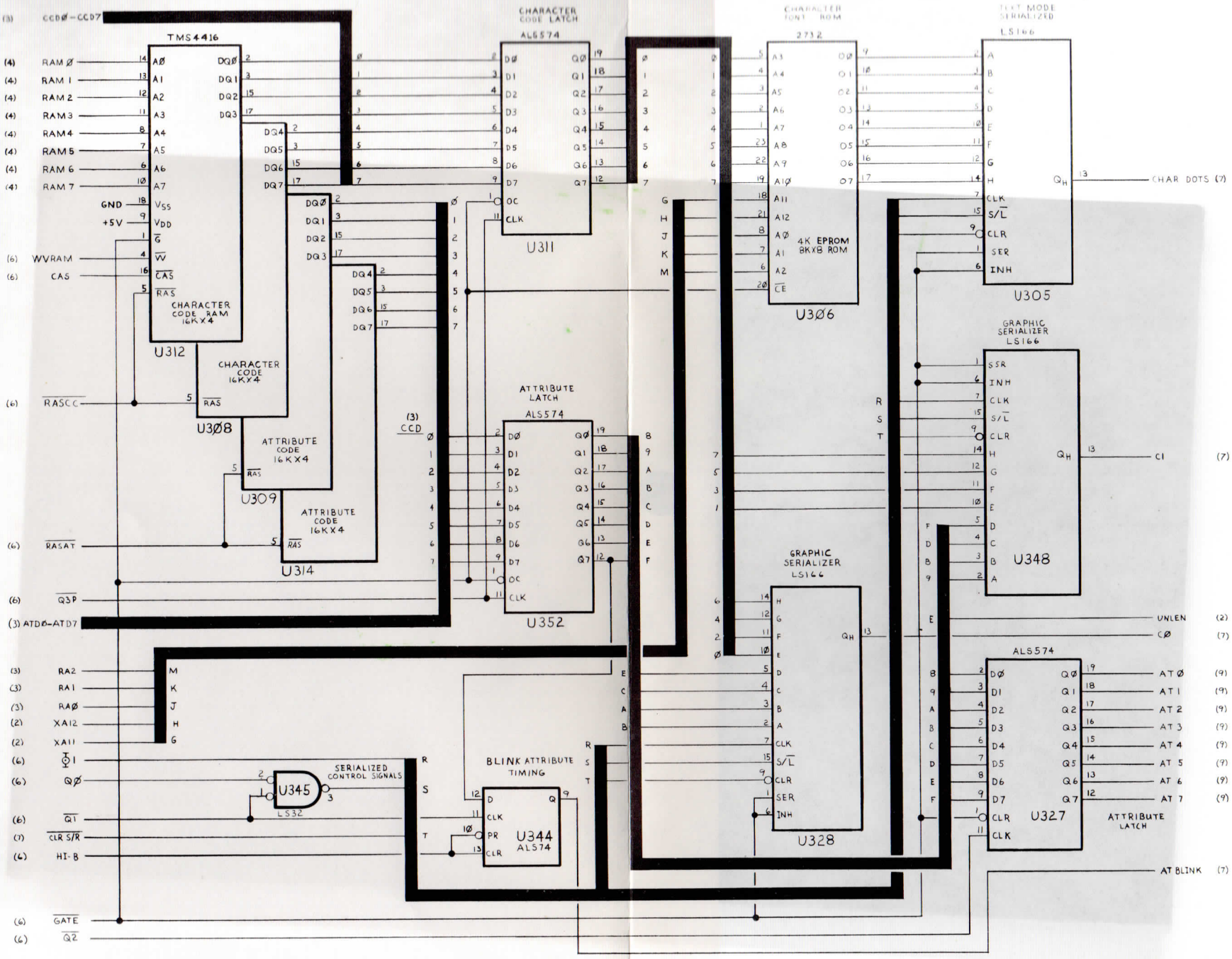


Figure 9.7. Video RAM, Data Latches, Serial Output

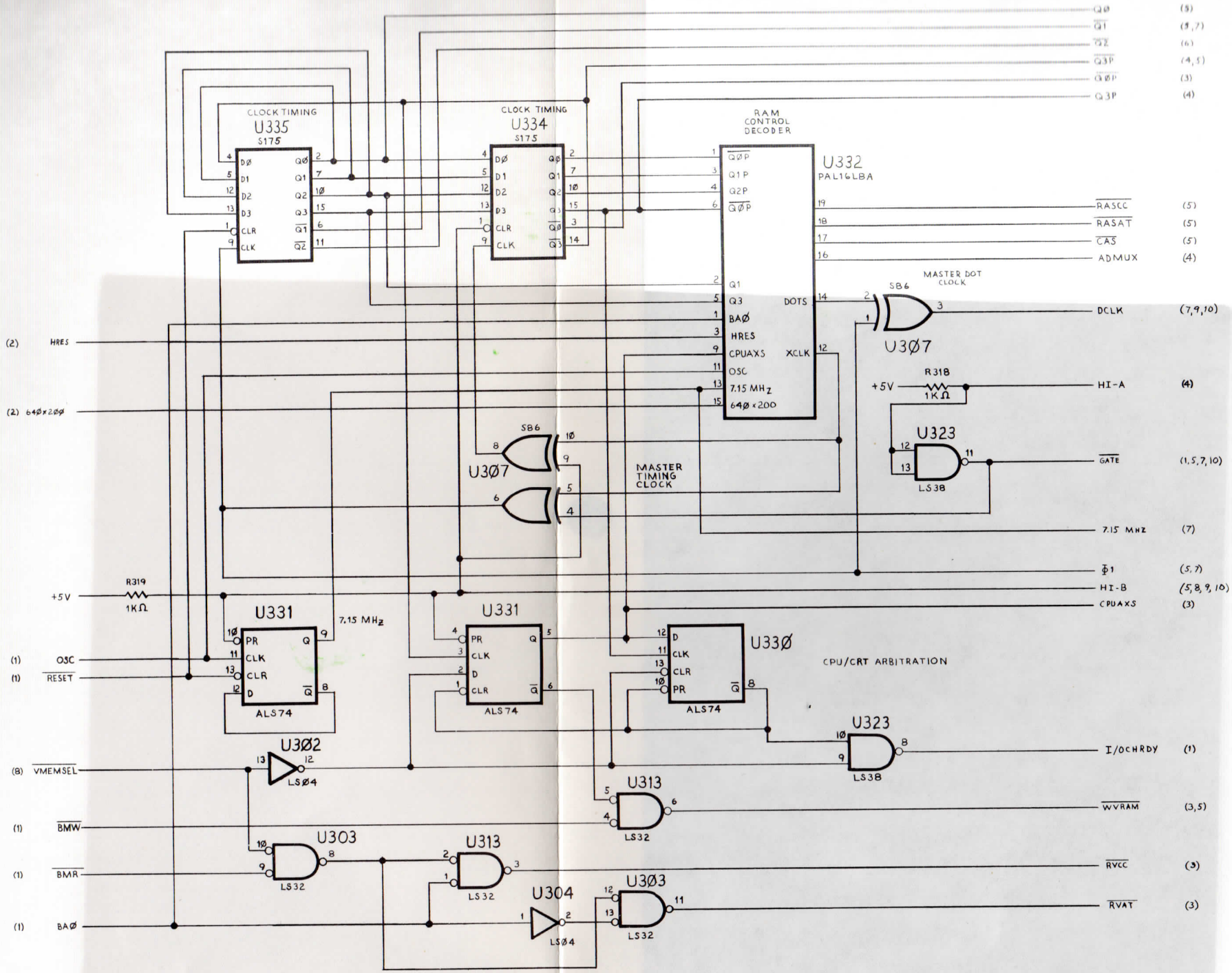


Figure 9-8. Video Timing and Control Circuits, Part 1

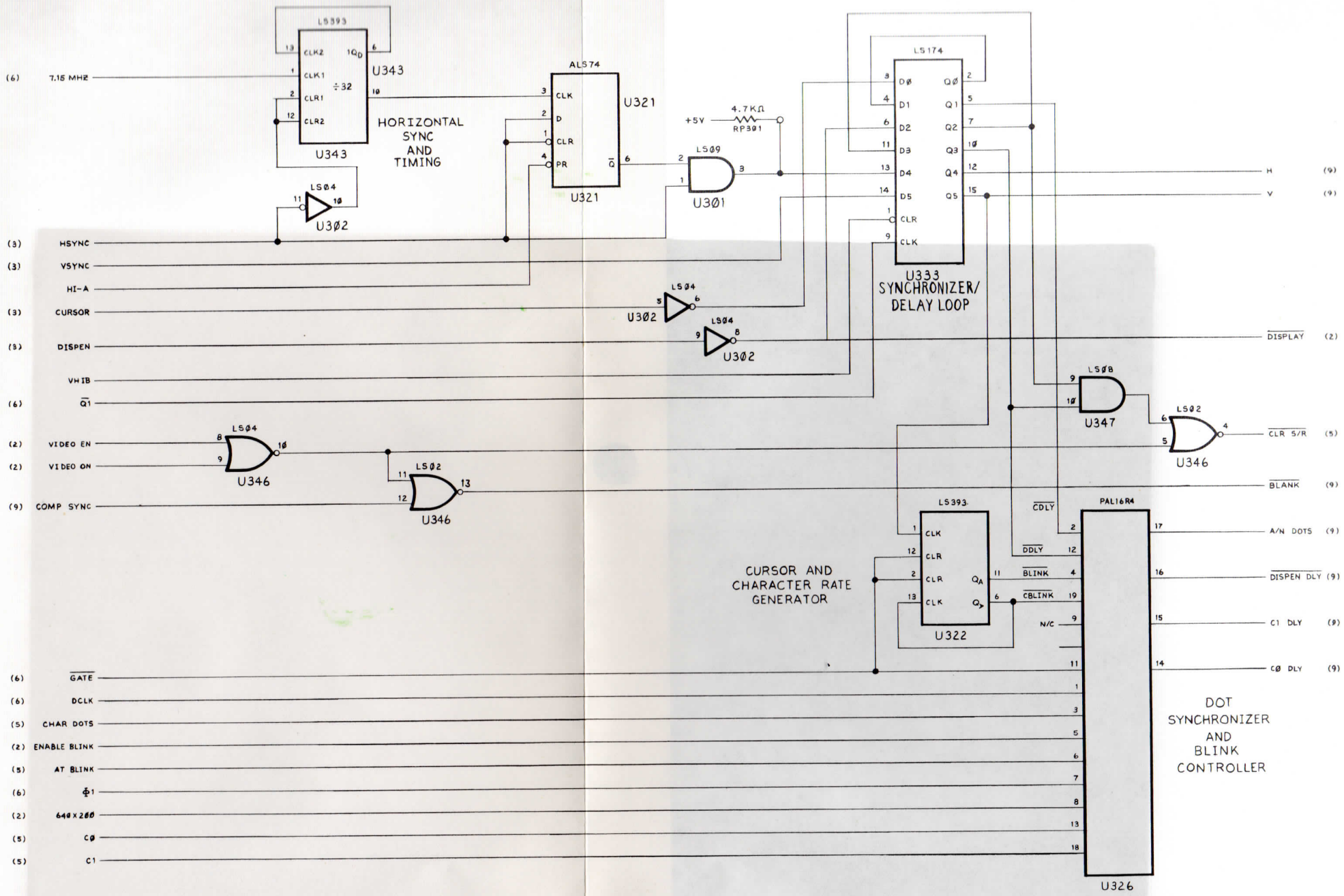
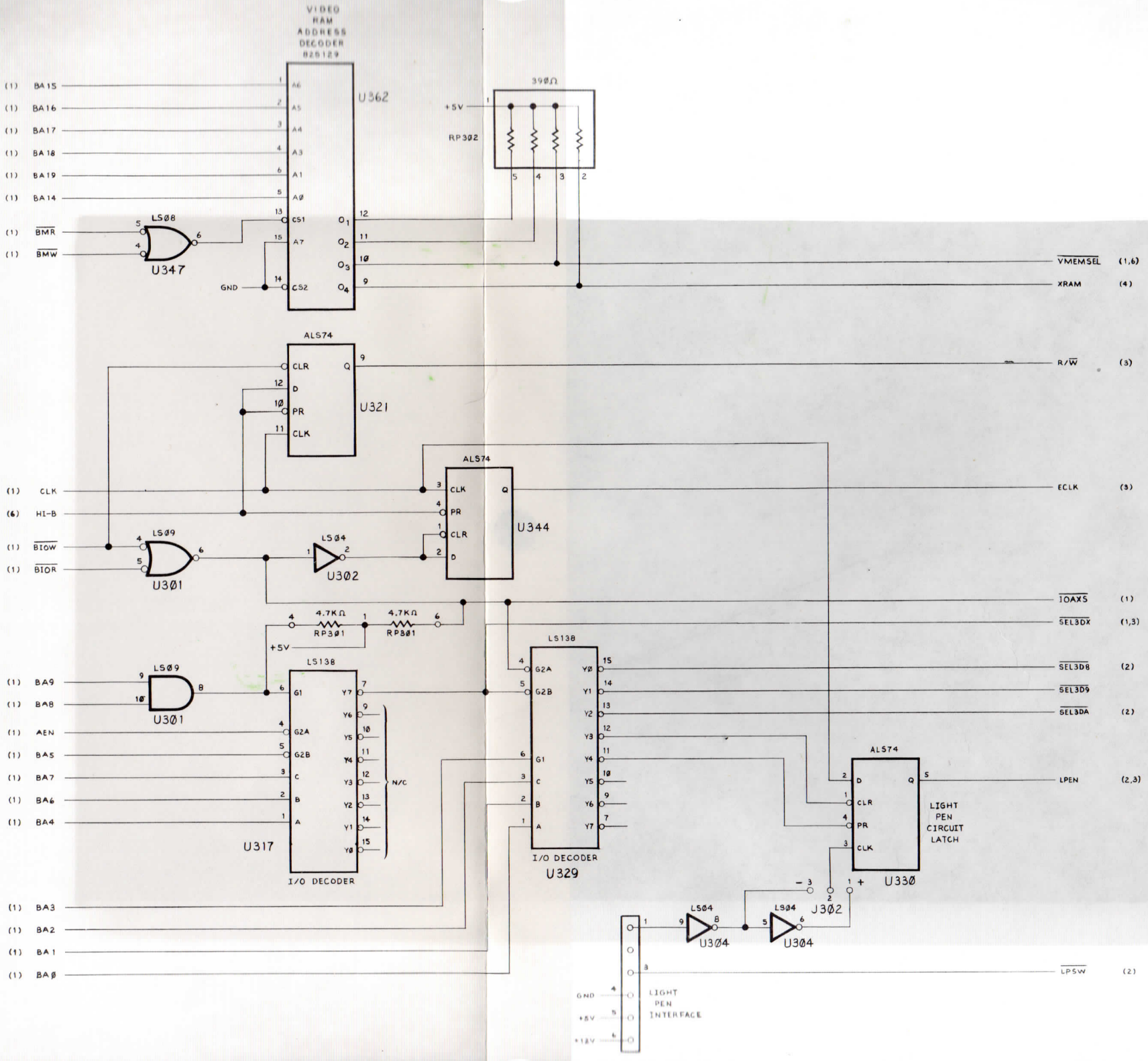


Figure 9.9. Video Timing and Control Circuits, Part 2


VIDEO RAM ADDRESS DECODER 825129
U362
(1) BA15
(1) BA16
(1) BA17
(1) BA18
(1) BA19
(1) BA14
(1) BMR
(1) BMW
LS08
U347
GND
+5V
390Ω
RP302
VMEMSEL (1,6)
XRAM (4)
ALS74
U321
R/W (3)
ECLK (3)
(1) CLK
(6) HI-B
LS09
U301
LS04
U302
U344
(1) BIOW
(1) BIOR
IOAXS (1)
SEL3DX (1,3)
4.7KΩ
RP301
SEL3D8 (2)
SEL3D9
SEL3DA (2)
LS138
U317
I/O DECODER
(1) BA9
(1) BA8
(1) AEN
(1) BA5
(1) BA7
(1) BA6
(1) BA4
N/C
U329
LPEN (2,3)
LIGHT PEN CIRCUIT LATCH
U330
(1) BA3
(1) BA2
(1) BA1
(1) BA0
J302
U304
LPSW (2)
GND
+5V
+12V
LIGHT PEN INTERFACE

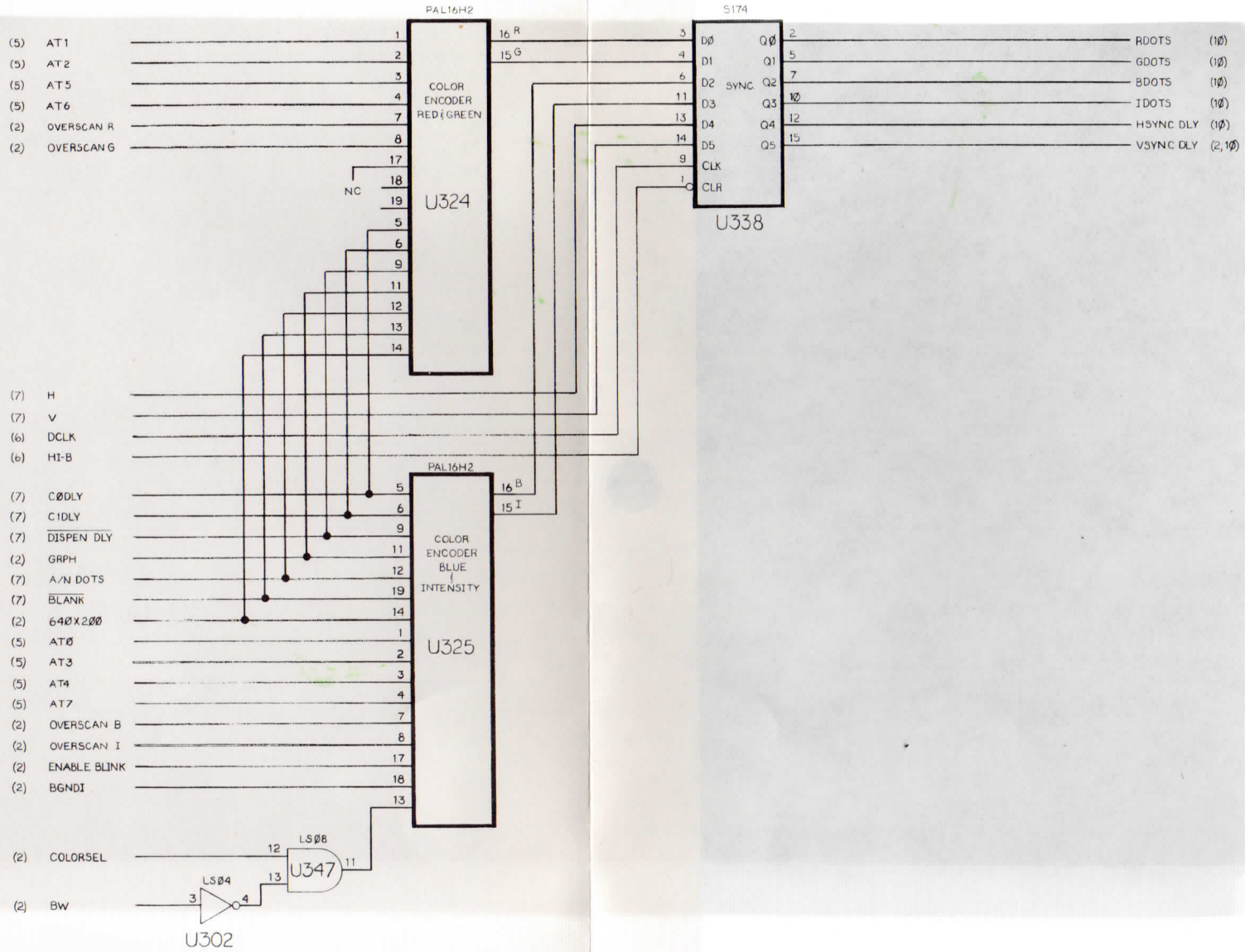
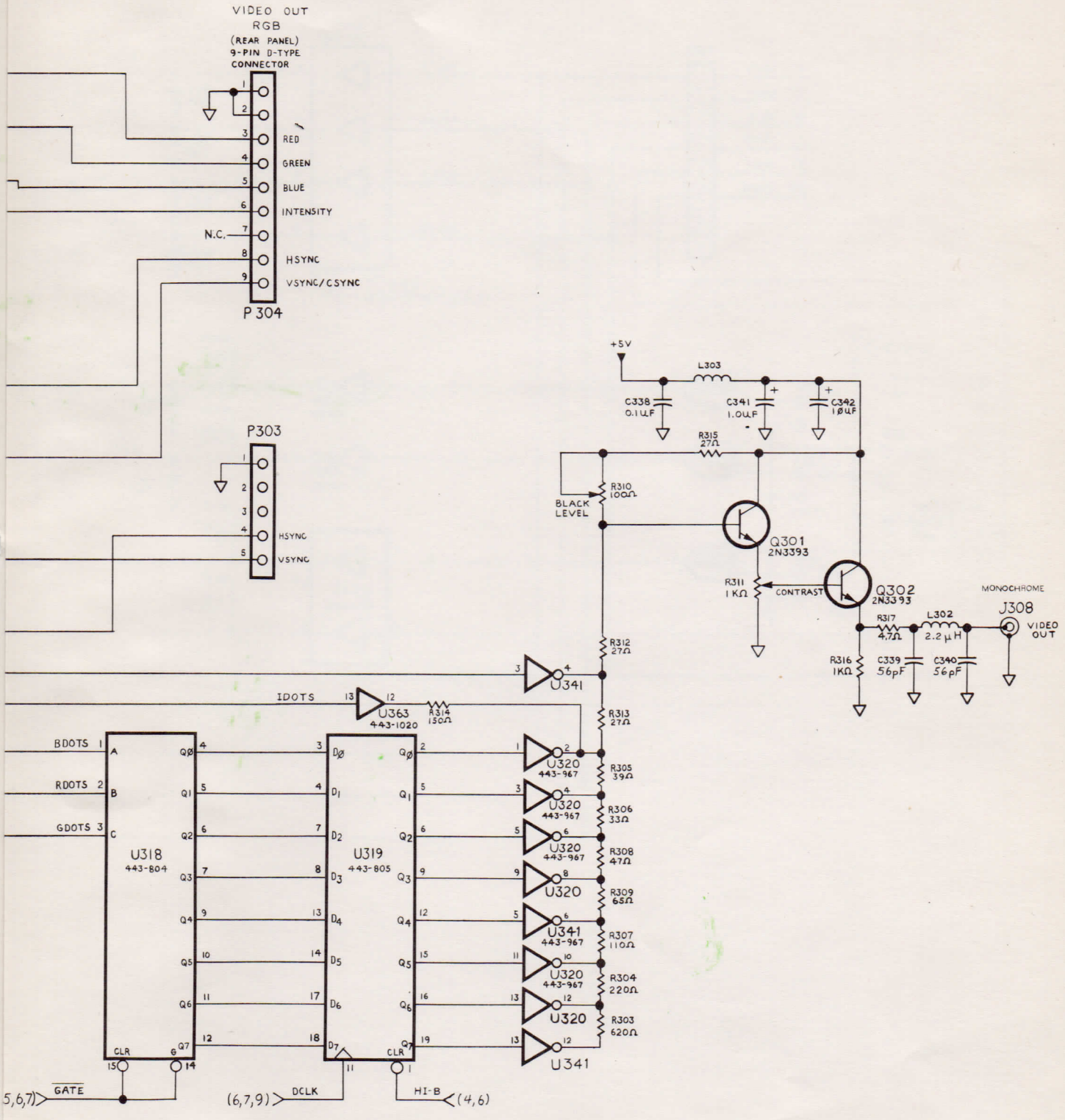


Figure 9.11. Color Video Encoder and Synchronization



Video Output

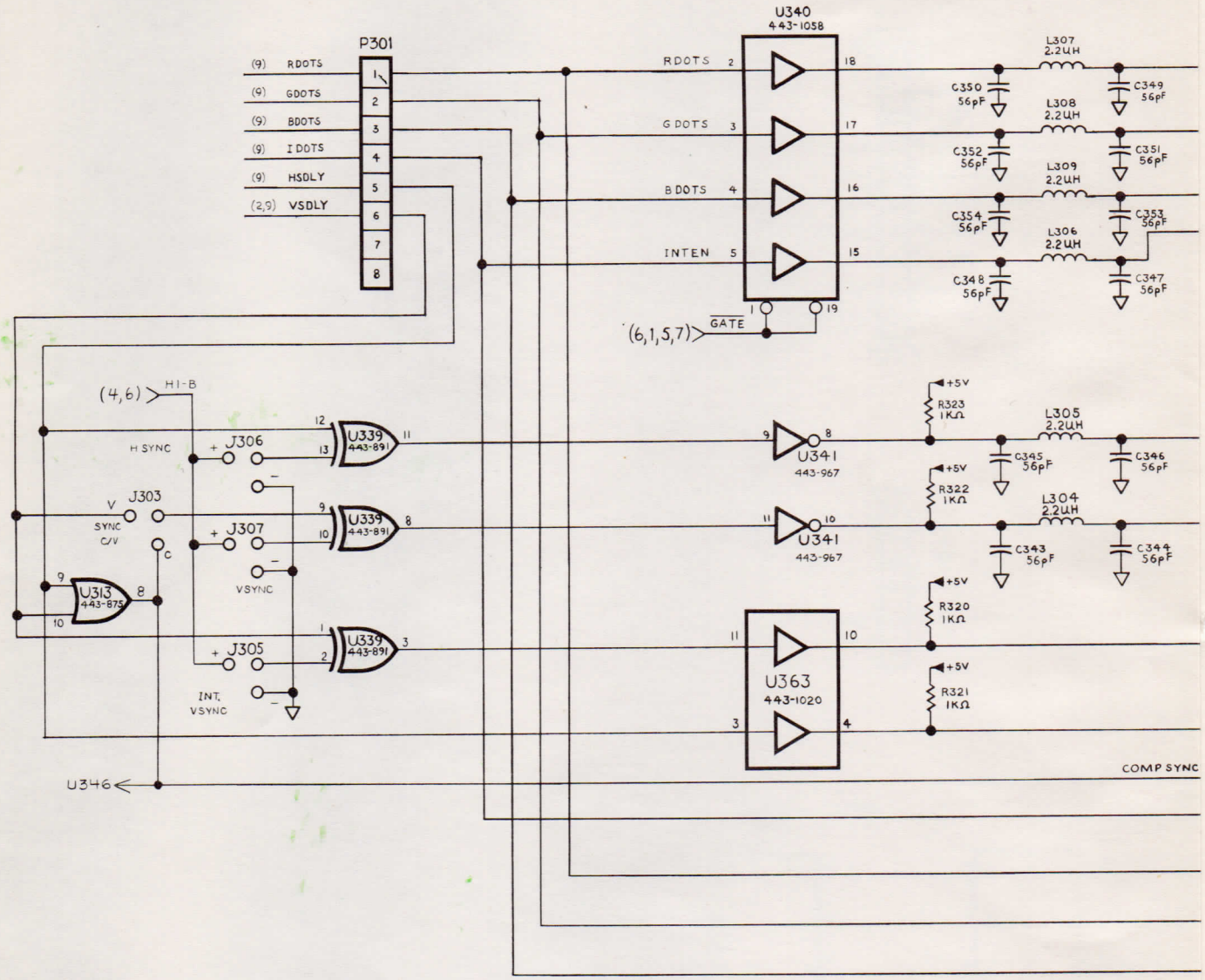

P301
(9) RDOTS
(9) GDOTS
(9) BDOTS
(9) IDOTS
(9) HSDLY
(2,9) VSDLY
U340
443-1058
RDOTS
GDOTS
BDOTS
INTEN
GATE
(6,1,5,7)
L307 2.2uH
L308 2.2uH
L309 2.2uH
L306 2.2uH
C350 56pF
C349 56pF
C352 56pF
C351 56pF
C354 56pF
C353 56pF
C348 56pF
C347 56pF
(4,6) HI-B
H SYNC
J306
J303
V SYNC C/V
J307
VSYNC
J305
INT. VSYNC
U339 443-891
U313 443-875
U341 443-967
U363 443-1020
+5V
R323 1KΩ
R322 1KΩ
R320 1KΩ
R321 1KΩ
L305 2.2uH
L304 2.2uH
C345 56pF
C346 56pF
C343 56pF
C344 56pF
U346
COMP SYNC

Figure 9.12.

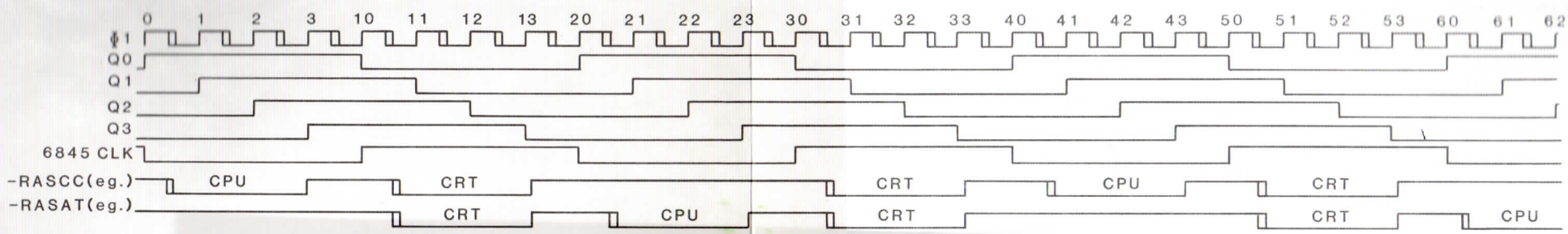


Figure 9.13. Video Timing

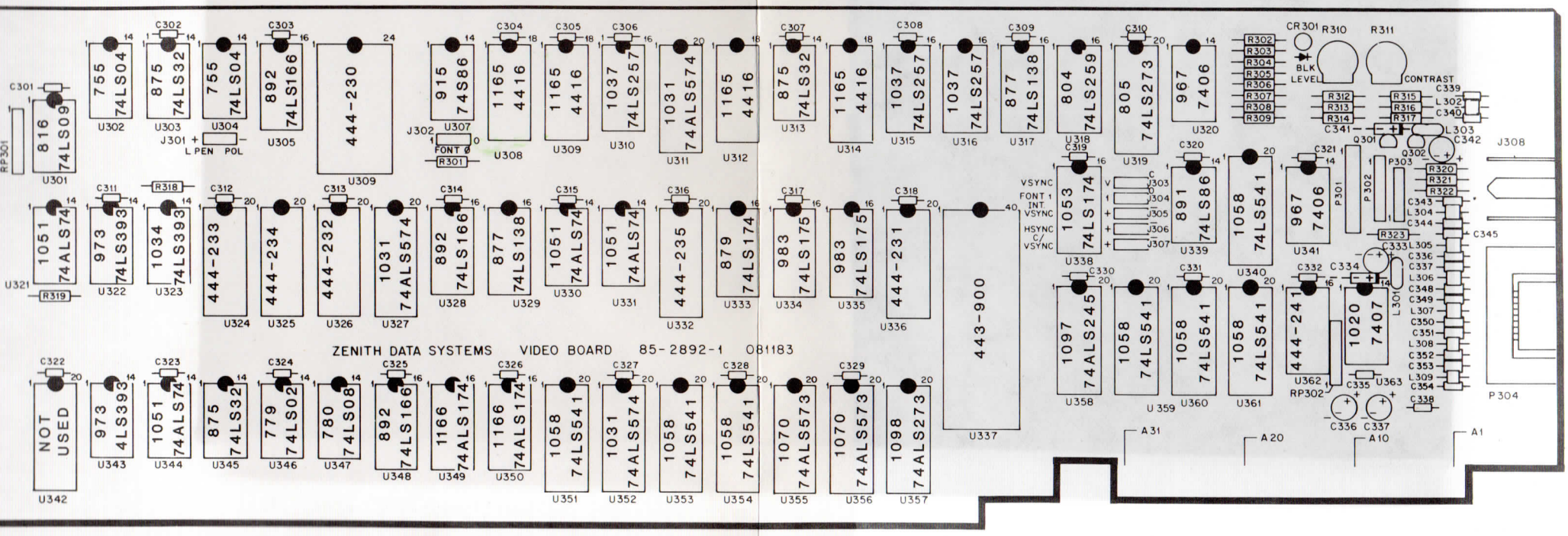


Table 5.11 (Continued). Troubleshooting Chart

PROBLEM	POSSIBLE CAUSE
Cursor not blinking.	U332
Wrong font or white screen.	J302, J305, U317, U329, U357, U358
No dots in the graphics mode or wrong dot data.	U348, U328, U332, U307
Duplicate data.	U310, U359, U315, U360, U316, U336
Random characters and attributes.	U353, U354, U355, U356, U308, U309, U312, U314

Video Timing

Figure 5.3 shows the timing relationships between the various video signals. Use of this chart will be of great help when isolating time-related video card malfunctions.

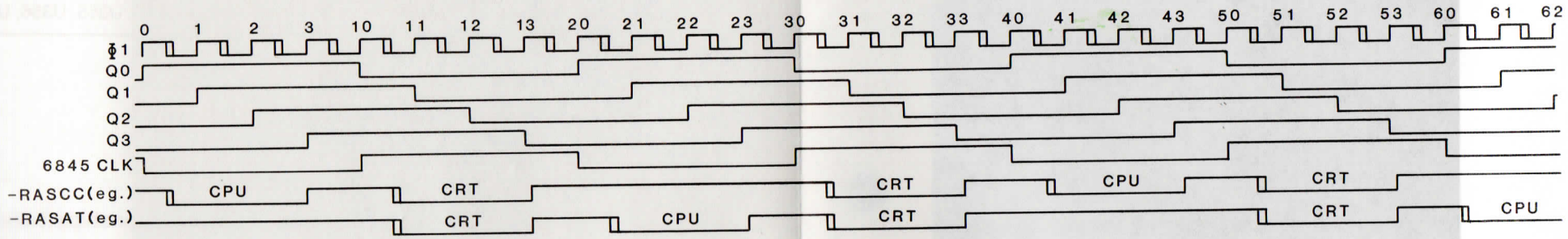


Figure 5.3. Video Timing

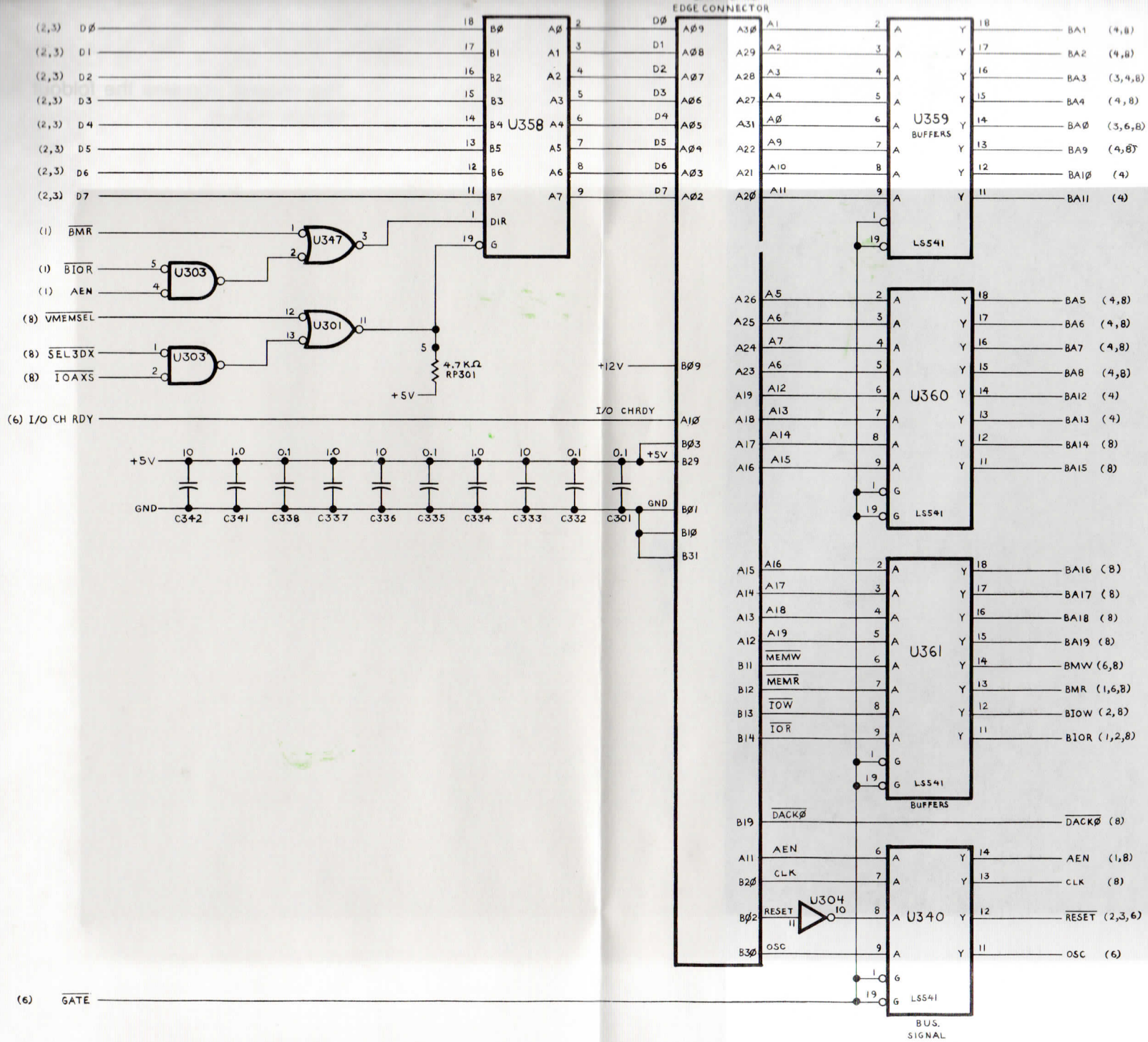


Figure 9.1. Bus Interface Circuits

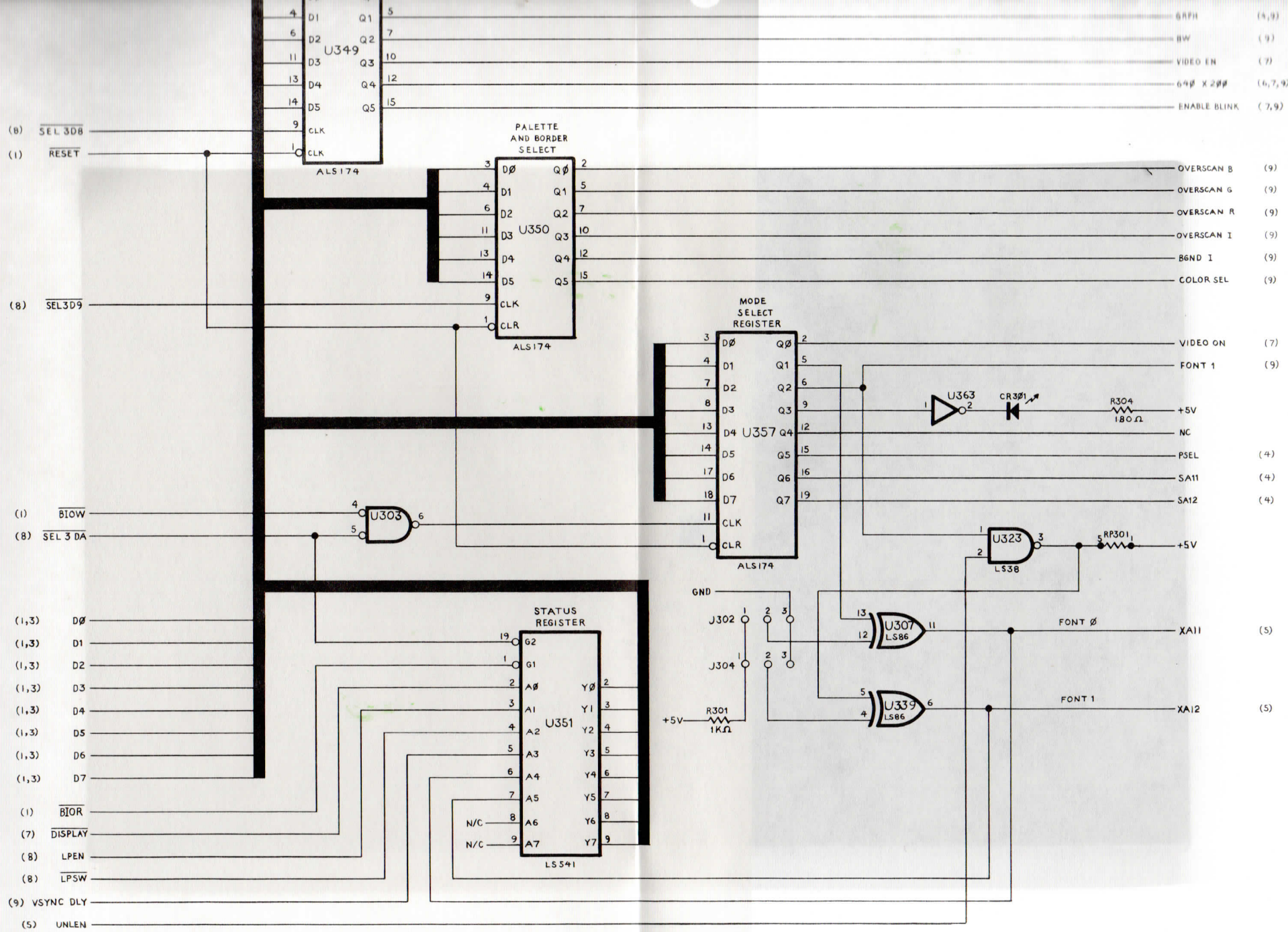


Figure 9.2. Video I/O Ports

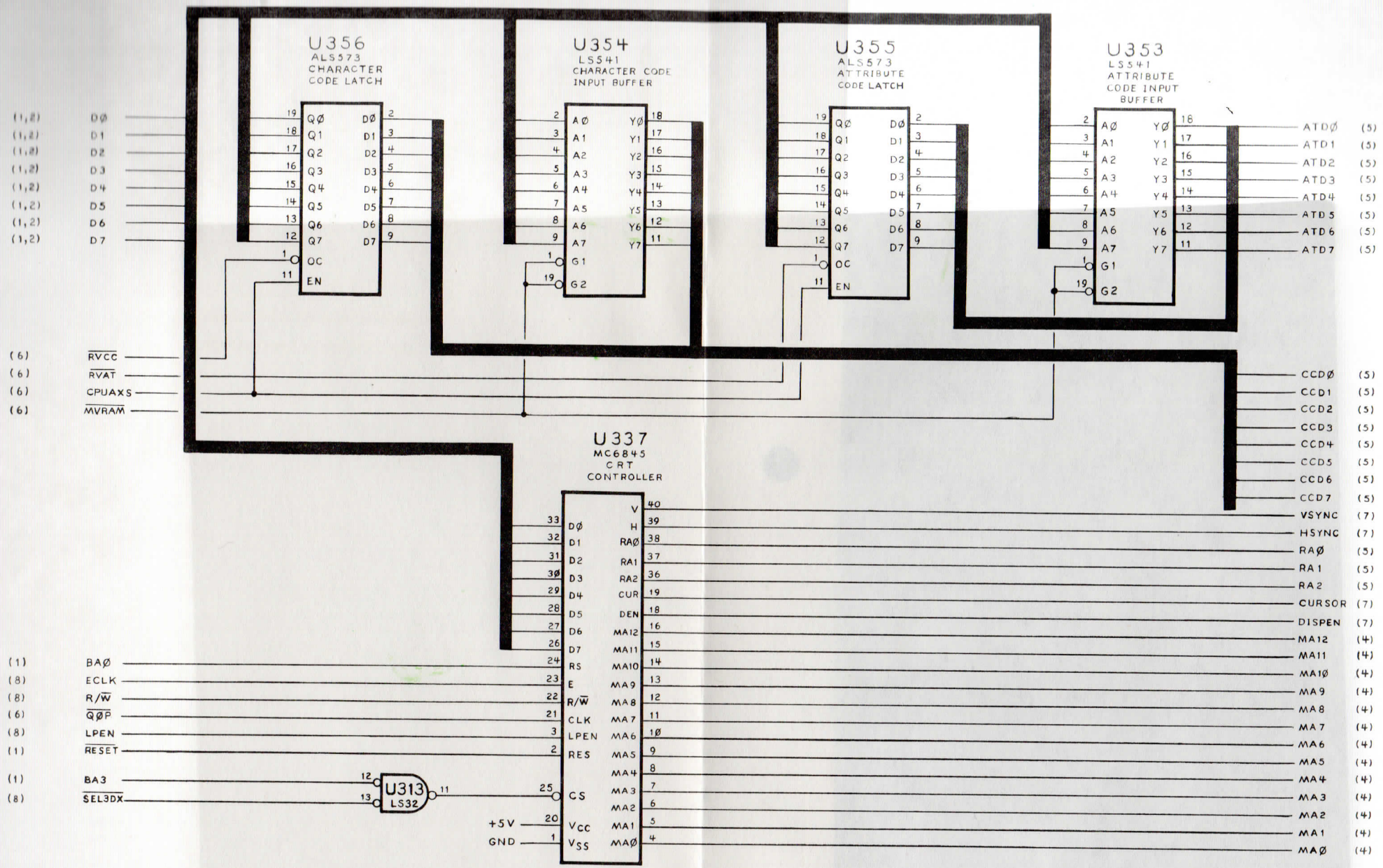


Figure 9.3. CRT Controller, Buffers, and Latches

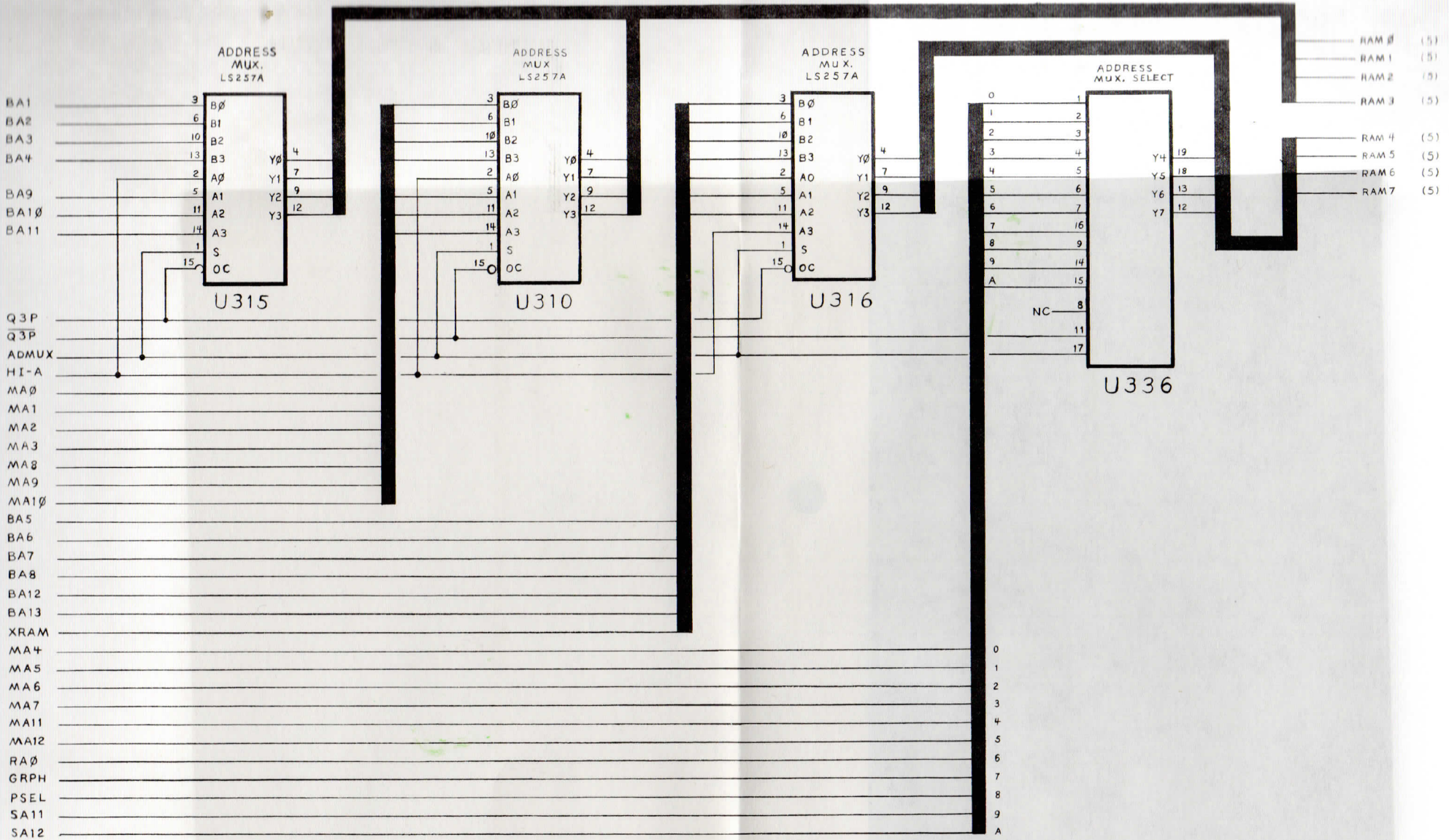


Figure 9.4. Video RAM Address Multiplexers

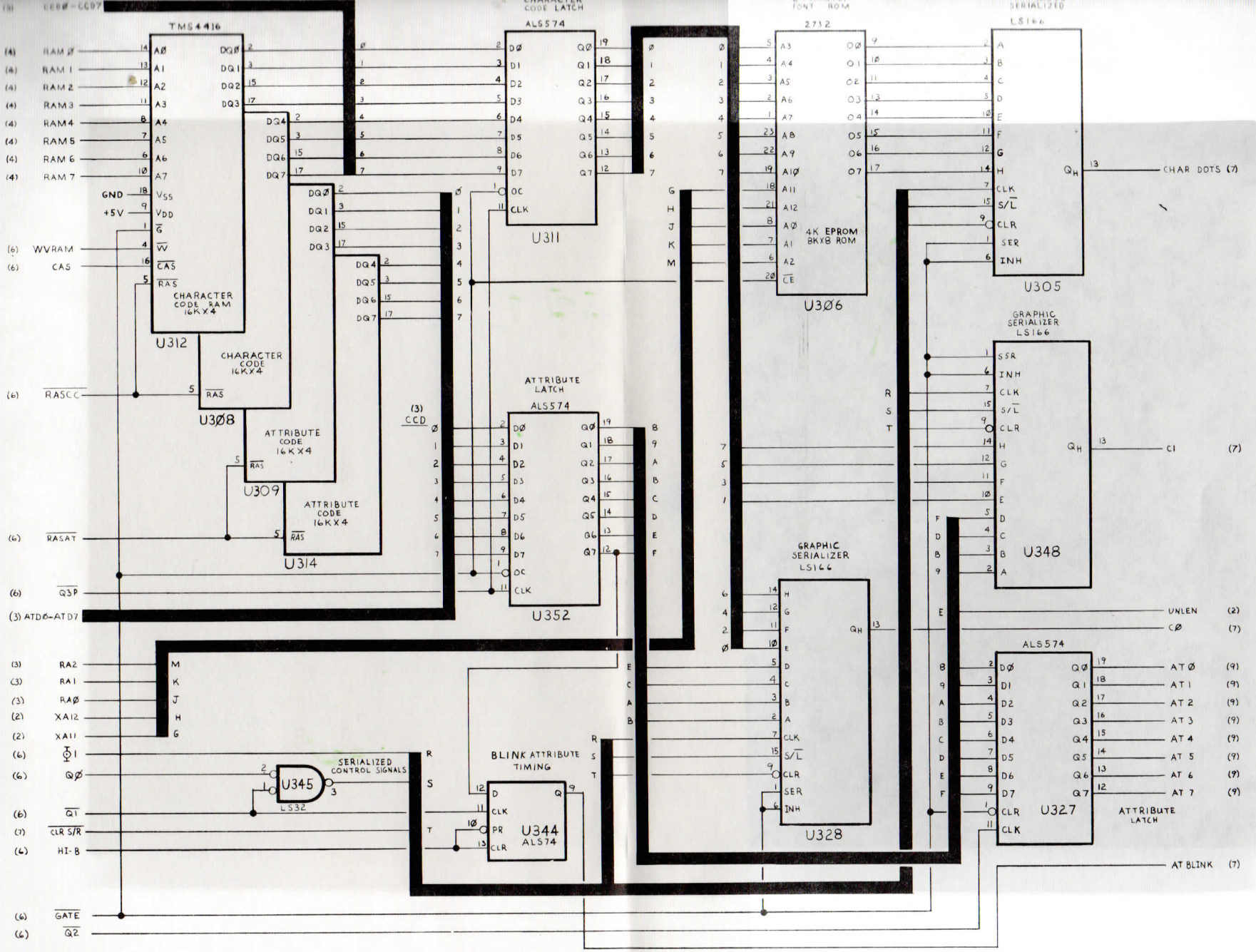


Figure 9.5. Video RAM, Data Latches, Serial Output

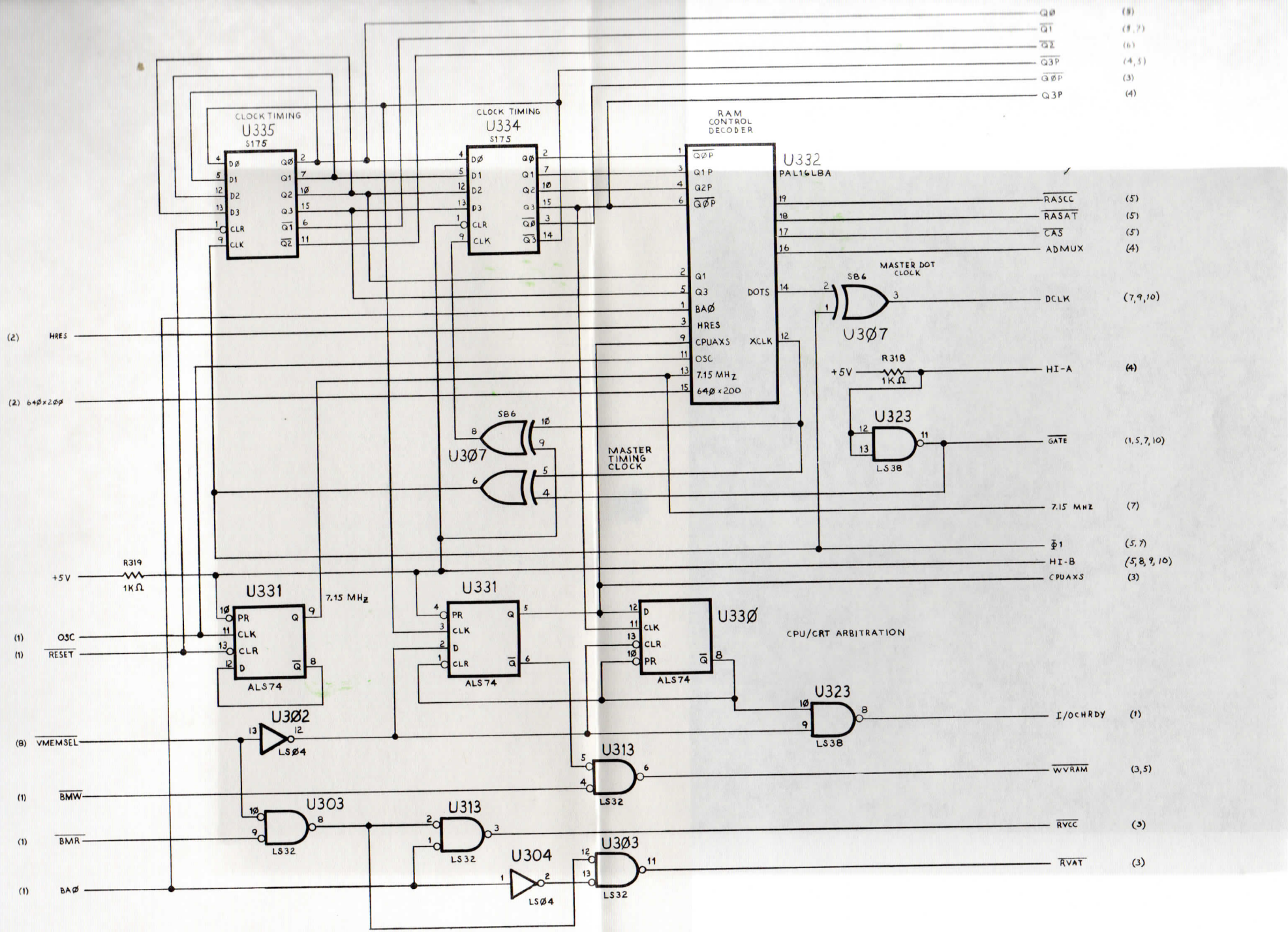


Figure 9.6. Video Timing and Control Circuits, Part 1

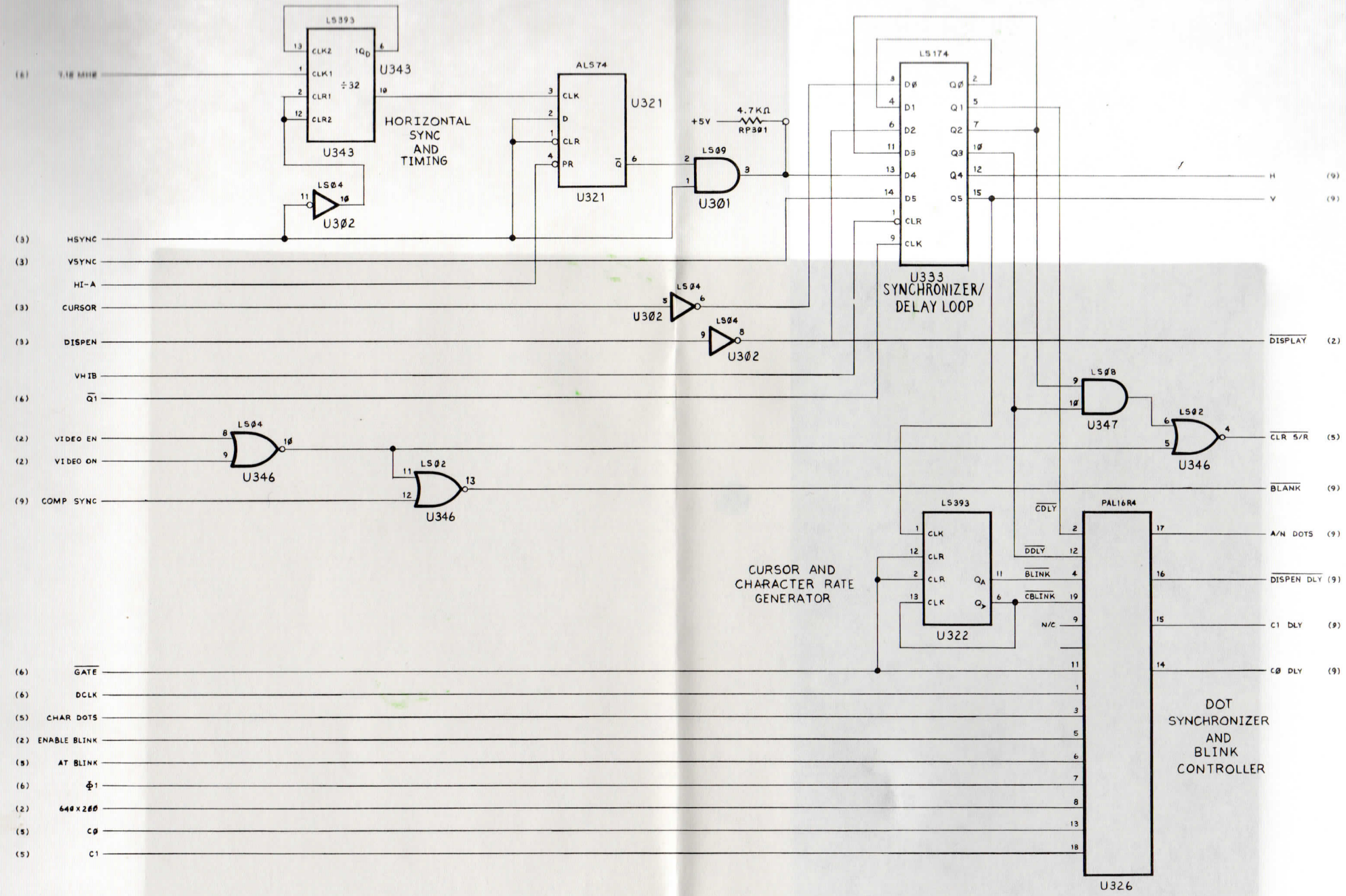


Figure 9.7. Video Timing and Control Circuits, Part 2

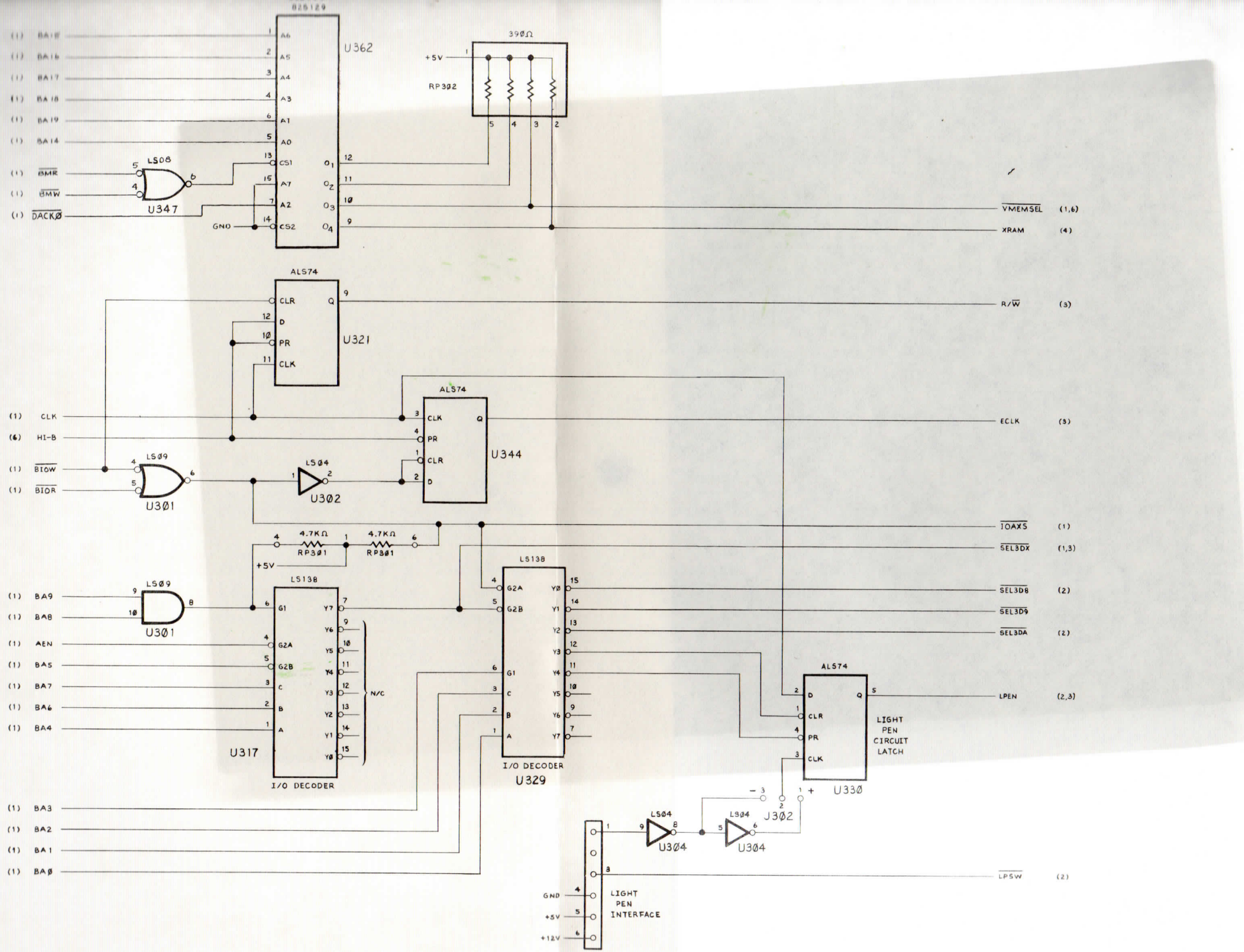


Figure 9.8. Video Memory and I/O Address Decoders

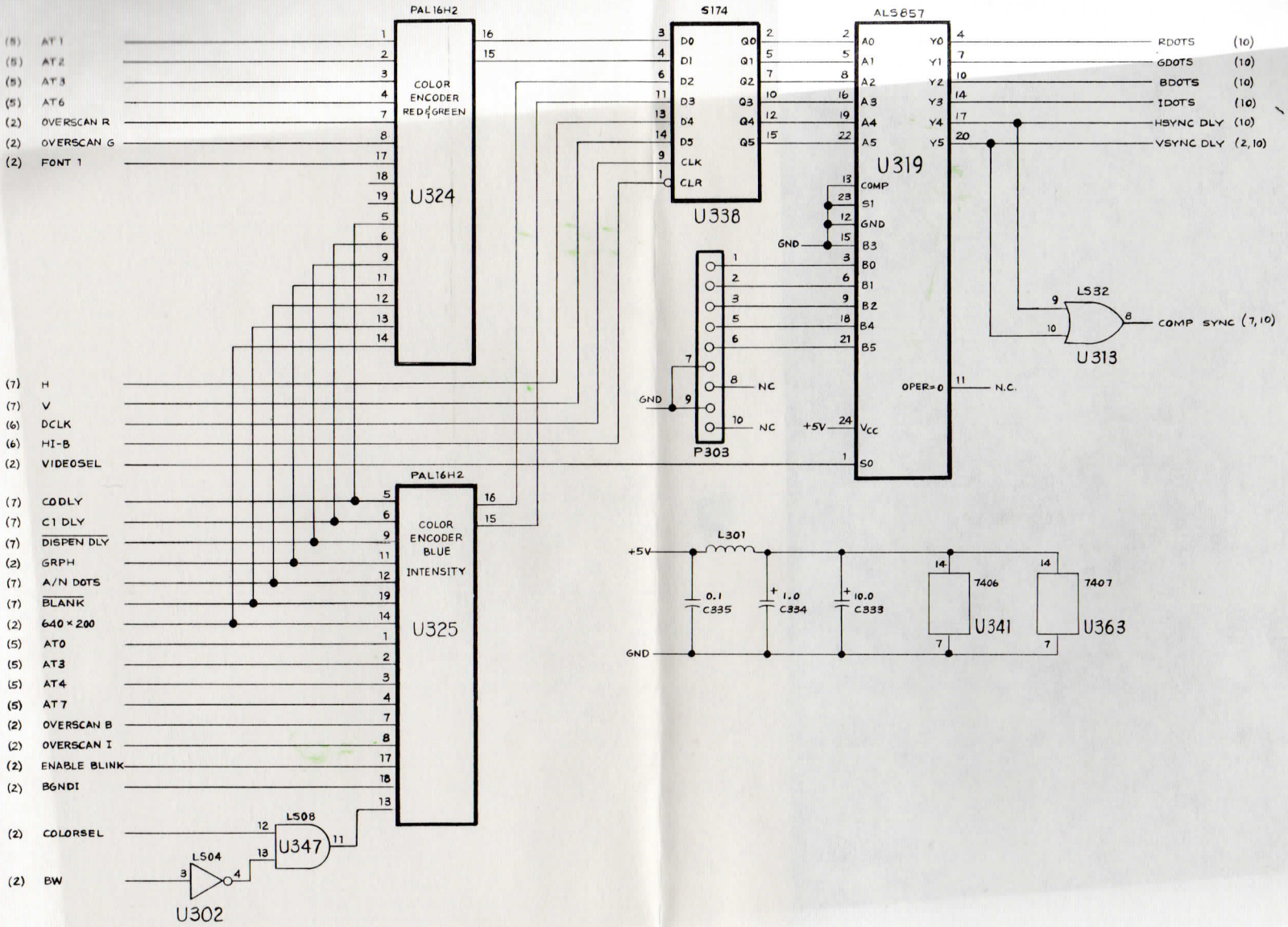
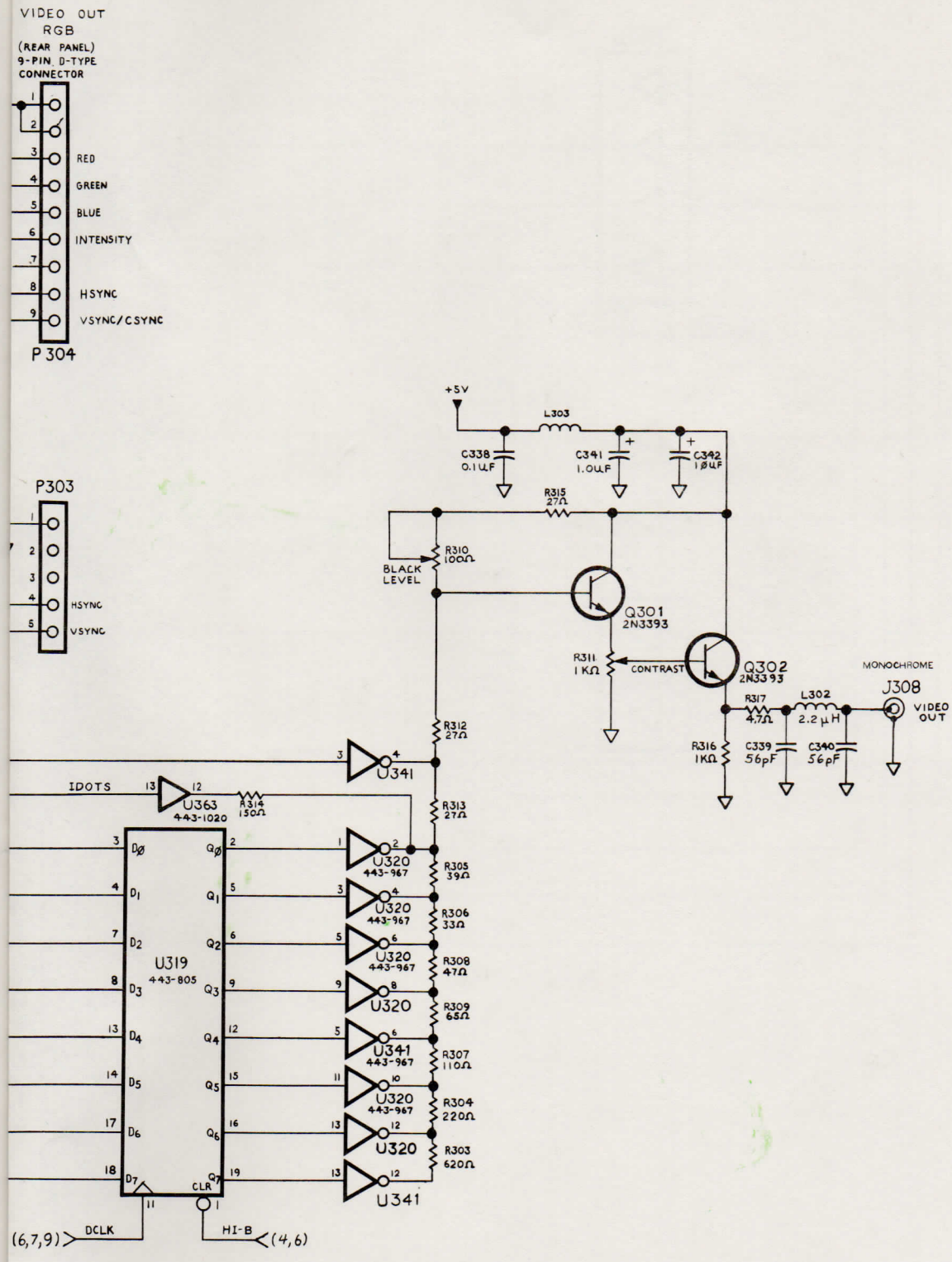


Figure 9.9. Color Video Encoder and Synchronization


VIDEO OUT
RGB
(REAR PANEL)
9-PIN D-TYPE
CONNECTOR
RED
GREEN
BLUE
INTENSITY
HSYNC
VSYNC/CSYNC
P 304
P303
HSYNC
VSYNC
+5V
L303
C338 0.1 µF
C341 1.0µF
C342 10µF
R315 27Ω
R310 100Ω
BLACK LEVEL
Q301 2N3393
R311 1 KΩ
CONTRAST
Q302 2N3393
MONOCHROME
J308
VIDEO OUT
R317 4.7Ω
L302 2.2 µH
R316 1KΩ
C339 56pF
C340 56pF
R312 27Ω
R313 27Ω
R305 39Ω
R306 33Ω
R308 47Ω
R309 65Ω
R307 110Ω
R304 220Ω
R303 620Ω
R314 150Ω
IDOTS
U363 443-1020
U319 443-805
U320 443-967
U341 443-967
U341
DCLK
(6,7,9)
HI-B
(4,6)

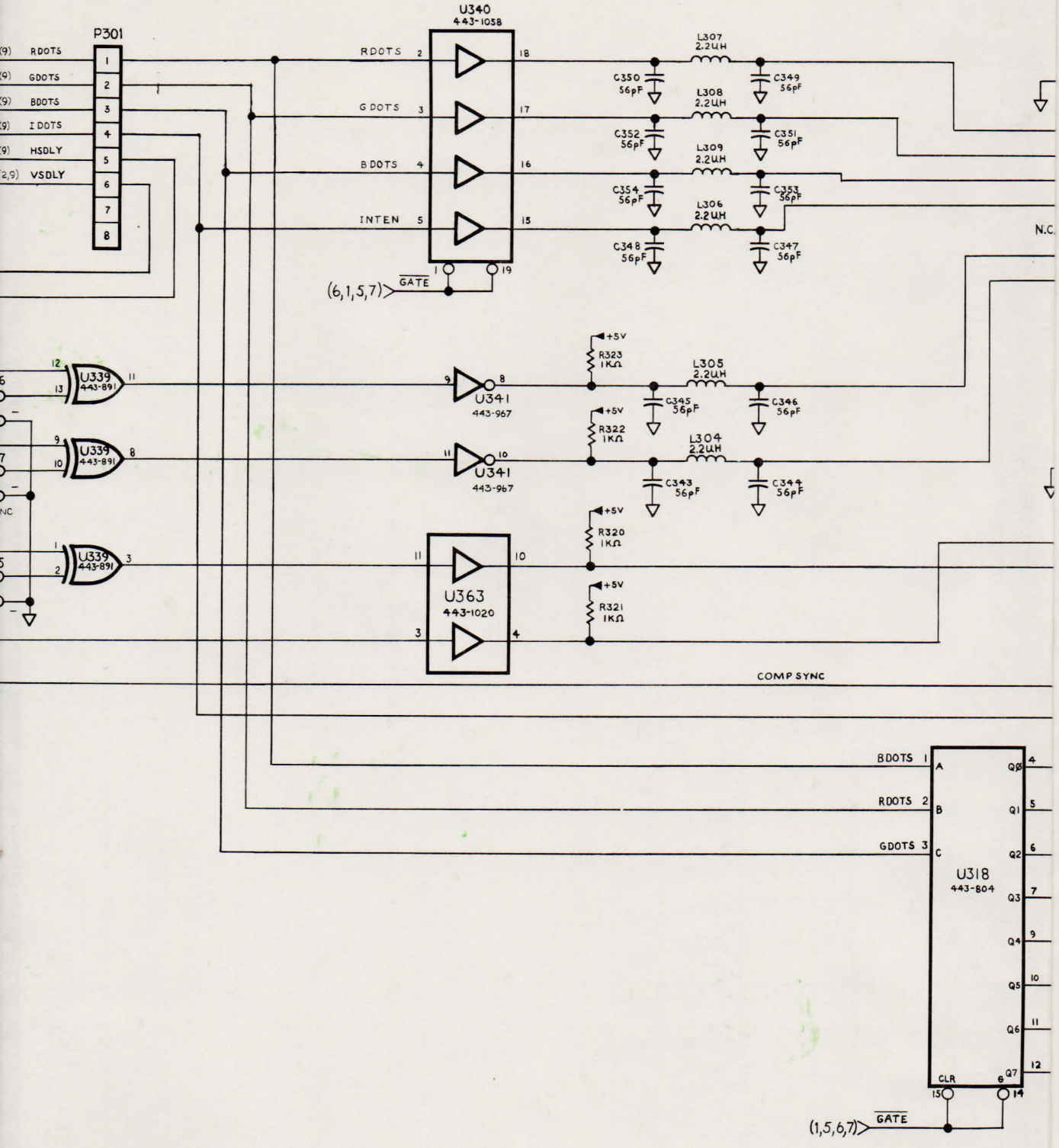
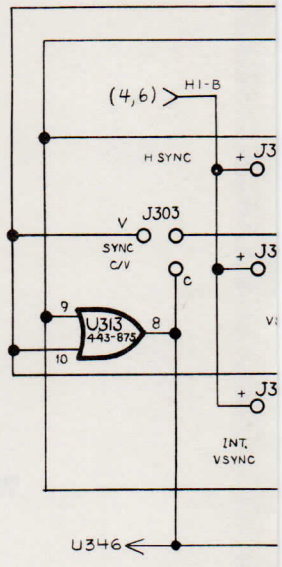
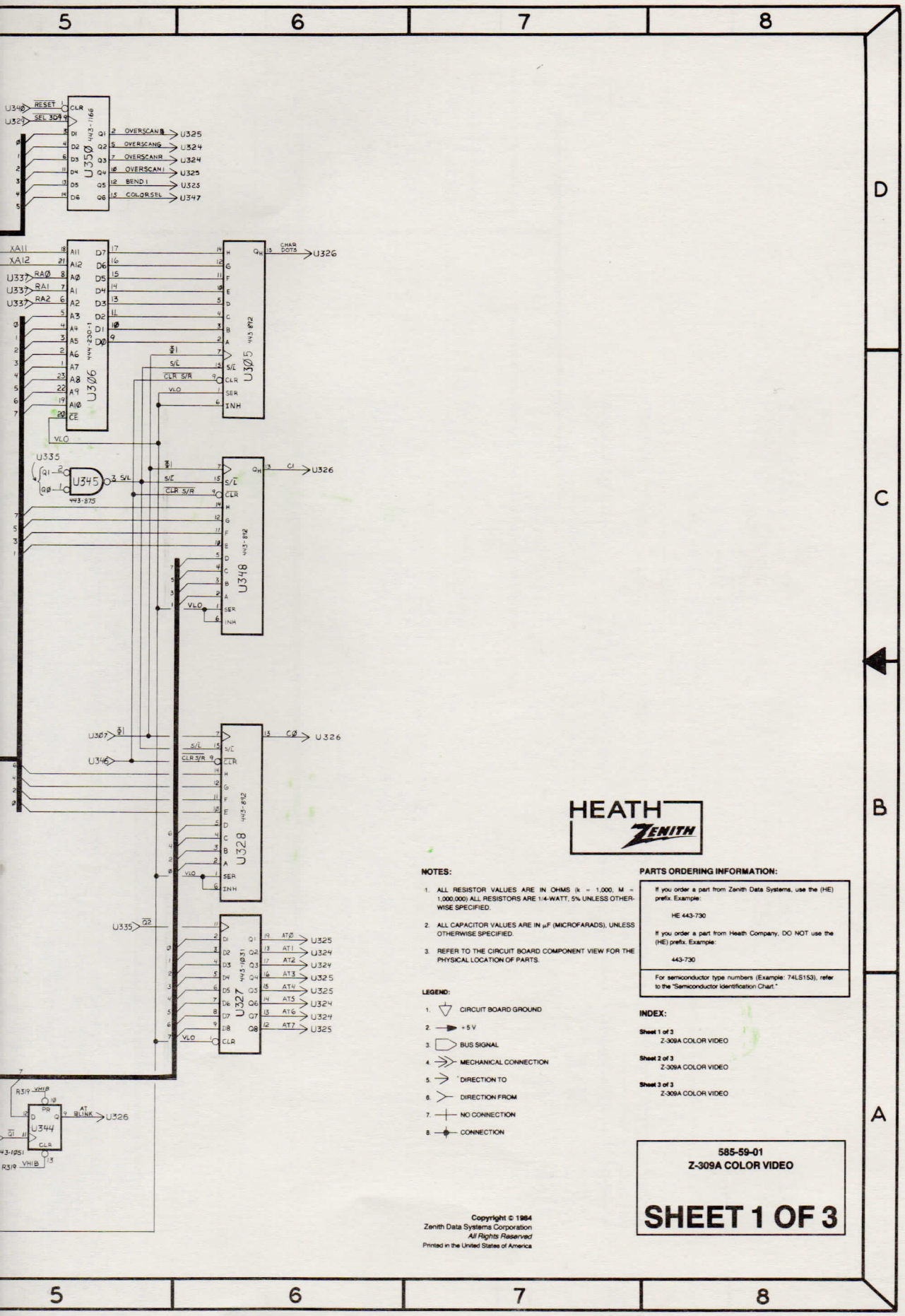


Figure 9.10. Video Output


(4,6)
H1-B
H SYNC
+ J3
V
J303
SYNC
C/V
C
+ J3
9
U313
443-875
8
10
+ J3
INT.
VSYNC
U346



HEATH ZENITH

NOTES:

1. ALL RESISTOR VALUES ARE IN OHMS (k = 1,000, M = 1,000,000) ALL RESISTORS ARE 1/4-WATT, 5% UNLESS OTHERWISE SPECIFIED.
2. ALL CAPACITOR VALUES ARE IN µF (MICROFARADS), UNLESS OTHERWISE SPECIFIED.
3. REFER TO THE CIRCUIT BOARD COMPONENT VIEW FOR THE PHYSICAL LOCATION OF PARTS.

LEGEND:

1. CIRCUIT BOARD GROUND
2. +5 V
3. BUS SIGNAL
4. MECHANICAL CONNECTION
5. DIRECTION TO
6. DIRECTION FROM
7. NO CONNECTION
8. CONNECTION

PARTS ORDERING INFORMATION:

If you order a part from Zenith Data Systems, use the (HE) prefix. Example:

HE 443-730

If you order a part from Heath Company, DO NOT use the (HE) prefix. Example:

443-730

For semiconductor type numbers (Example: 74LS153), refer to the "Semiconductor Identification Chart."

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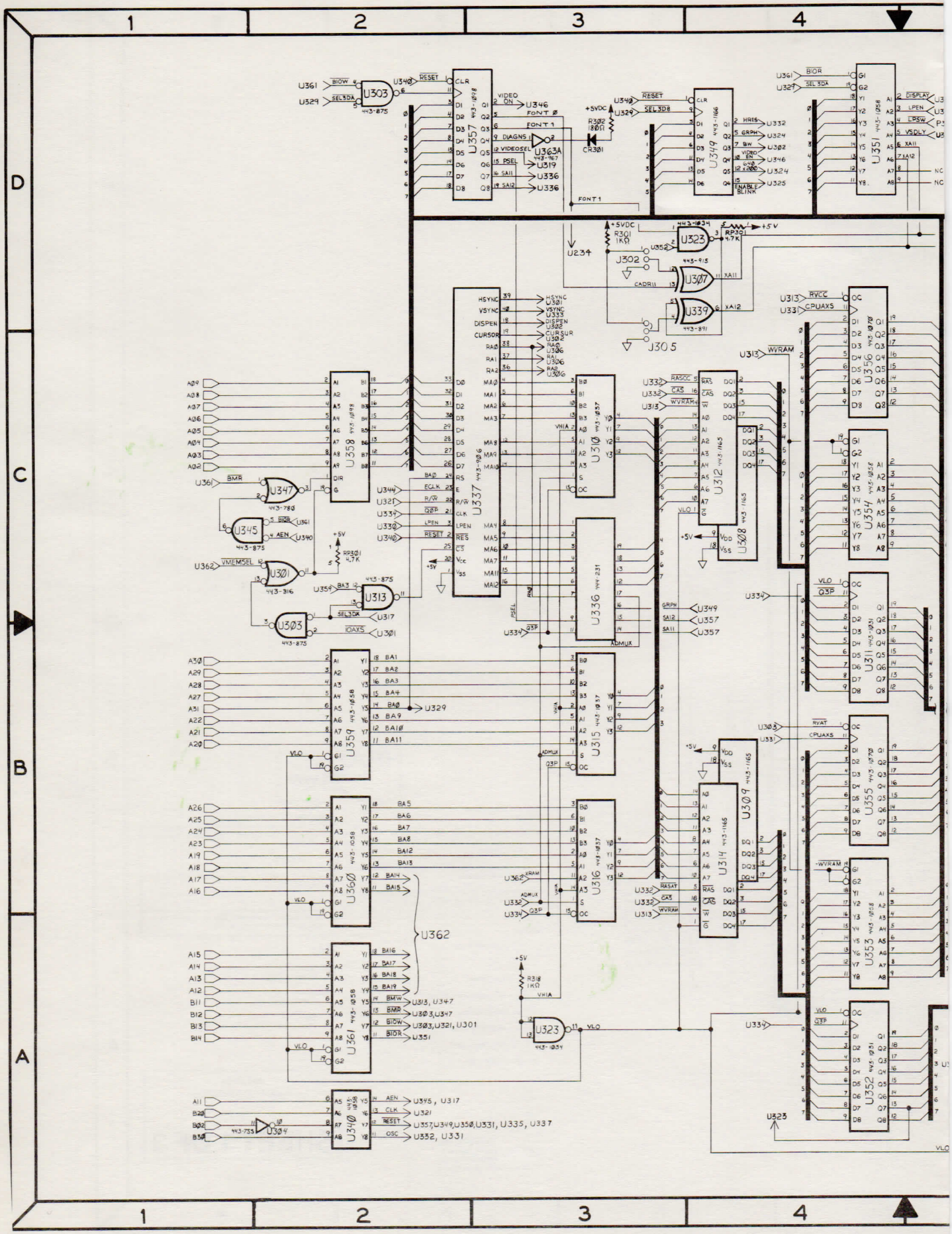
U303
U357
U346
U3Ø3A
U319
U336
U349
U332
U324
U3Ø2
U325
U351
U323
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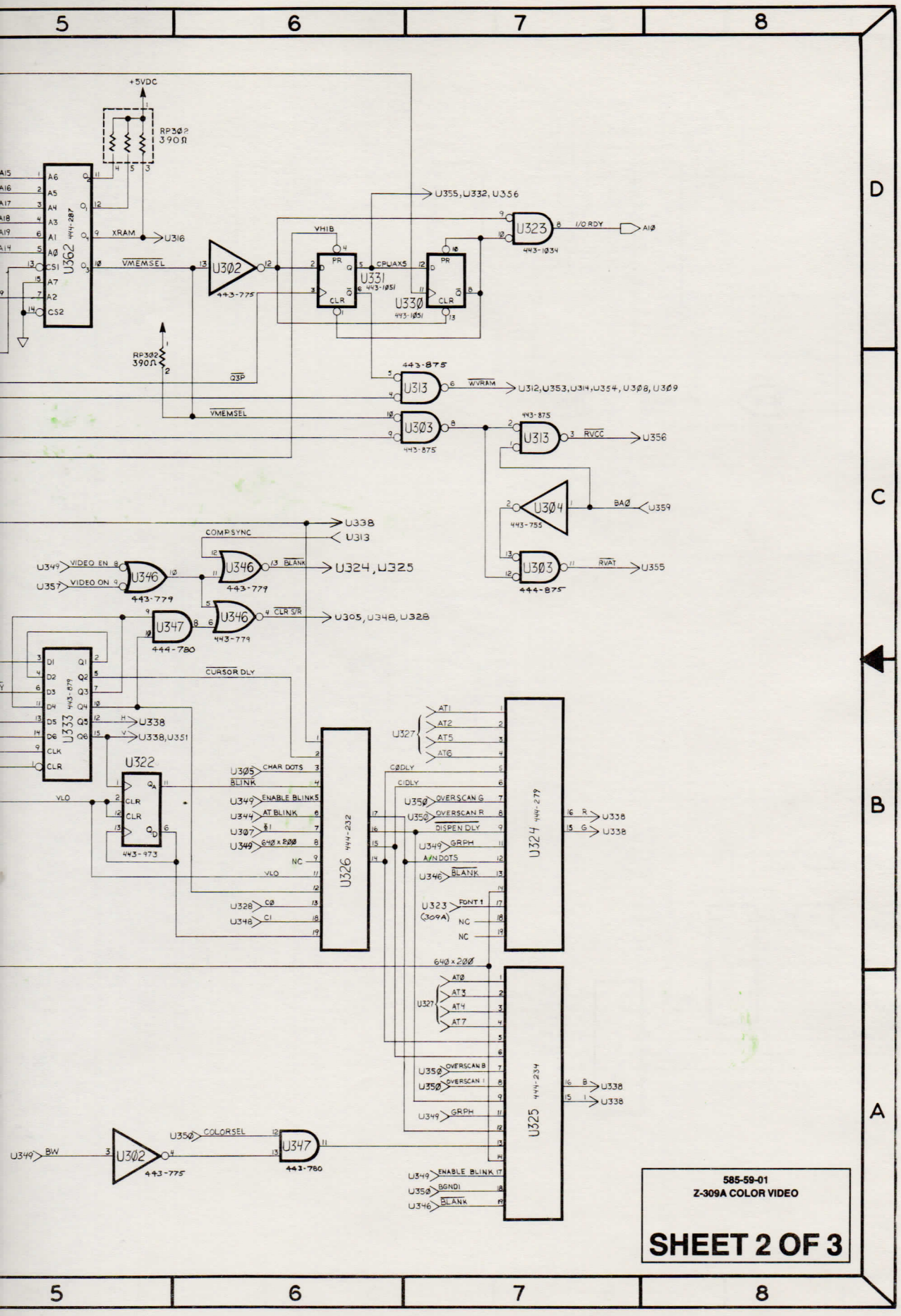
U339
U234
J3Ø2
J3Ø5
U358
U337
U347
U345
U361
U362
U3Ø1
U313
U317
U344
U321
U339
U33Ø
U34Ø
U336
U334
U312
U3Ø8
U356
U354
U311
U355
U353
U352
U359
U329
U315
U314
U3Ø9
U316
U362
U36Ø
U361
U34Ø
U3Ø4
U347, U317
U321
U357,U349,U35Ø,U331, U335, U337
U332, U331
U3Ø3,U321, U3Ø1
U351
U3Ø3,U347
U313, U347
U323
VLO
+5V
+5VDC
WVRAM
RVCC
CPUAXS
RVAT
ADMUX
VHIA
FONT1
CADR11
XA11
XA12
RASCC
RASAT
GRPH
SA11
SA12
PSEL
VIDEO ON
FONT Ø
FONT 1
DIAGNS
VIDEOSEL
HRES
BW
ENABLE BLINK
DISPLAY
LPEN
LPSW
VSDLY
HSYNC
VSYNC
DISPEN
CURSOR
ECLK
R/W
LPEN
RESET
BMR
BMW
BIOR
BIOW
AEN
VMEMSEL
IOAXS
SEL3DA
SEL3DB
SEL3DX
BA3
BA4
BA5
BA6
BA7
BA8
BA9
BA1Ø
BA11
BA12
BA13
BA14
BA15
BA16
BA17
BA18
BA19
OSC
R3Ø2 18Ø Ω
R3Ø1 1KΩ
RP3Ø1 4.7K
R318 1KΩ
CR3Ø1
443-1Ø34
443-915
443-891
443-1165
443-1Ø58
443-1Ø37
443-1Ø98
443-1Ø51
443-9Ø6
444-231
443-875
443-316
443-78Ø
443-735


5
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7
8
D
C
B
A
+5VDC
RP302
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444-287
XRAM
U316
VMEMSEL
U302
443-775
VHIB
U331
443-1051
CPUAX5
U330
443-1051
U323
443-1034
I/O RDY
AI0
U355, U332, U356
RP302
390Ω
Q3P
443-875
U313
WVRAM
U312, U353, U314, U354, U308, U309
U303
443-875
U313
443-875
RVCC
U356
U304
443-755
BA0
U359
U303
444-875
RVAT
U355
U338
COMPSYNC
U313
U349
VIDEO EN
U357
VIDEO ON
U346
443-779
BLANK
U324, U325
U346
443-779
U346
443-779
CLR S/R
U305, U348, U328
U347
444-780
U333
443-879
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H
U338
V
U338, U351
U322
VLO
443-973
U305
CHAR DOTS
BLINK
U349
ENABLE BLINK
U344
AT BLINK
U307
$1
U349
640 x 200
NC
VLO
U328
C0
U348
C1
U326
444-232
U327
AT1
AT2
AT5
AT6
C0DLY
C1DLY
U350
OVERSCAN G
U350
OVERSCAN R
DISPEN DLY
U349
GRPH
A/N DOTS
U346
BLANK
U323
(309A)
FONT 1
NC
NC
U324
444-279
R
U338
G
U338
640 x 200
U327
AT0
AT3
AT4
AT7
U350
OVERSCAN B
U350
OVERSCAN I
U349
GRPH
U325
444-234
B
U338
I
U338
U349
ENABLE BLINK
U350
BGND1
U346
BLANK
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COLORSEL
U347
443-780
585-59-01
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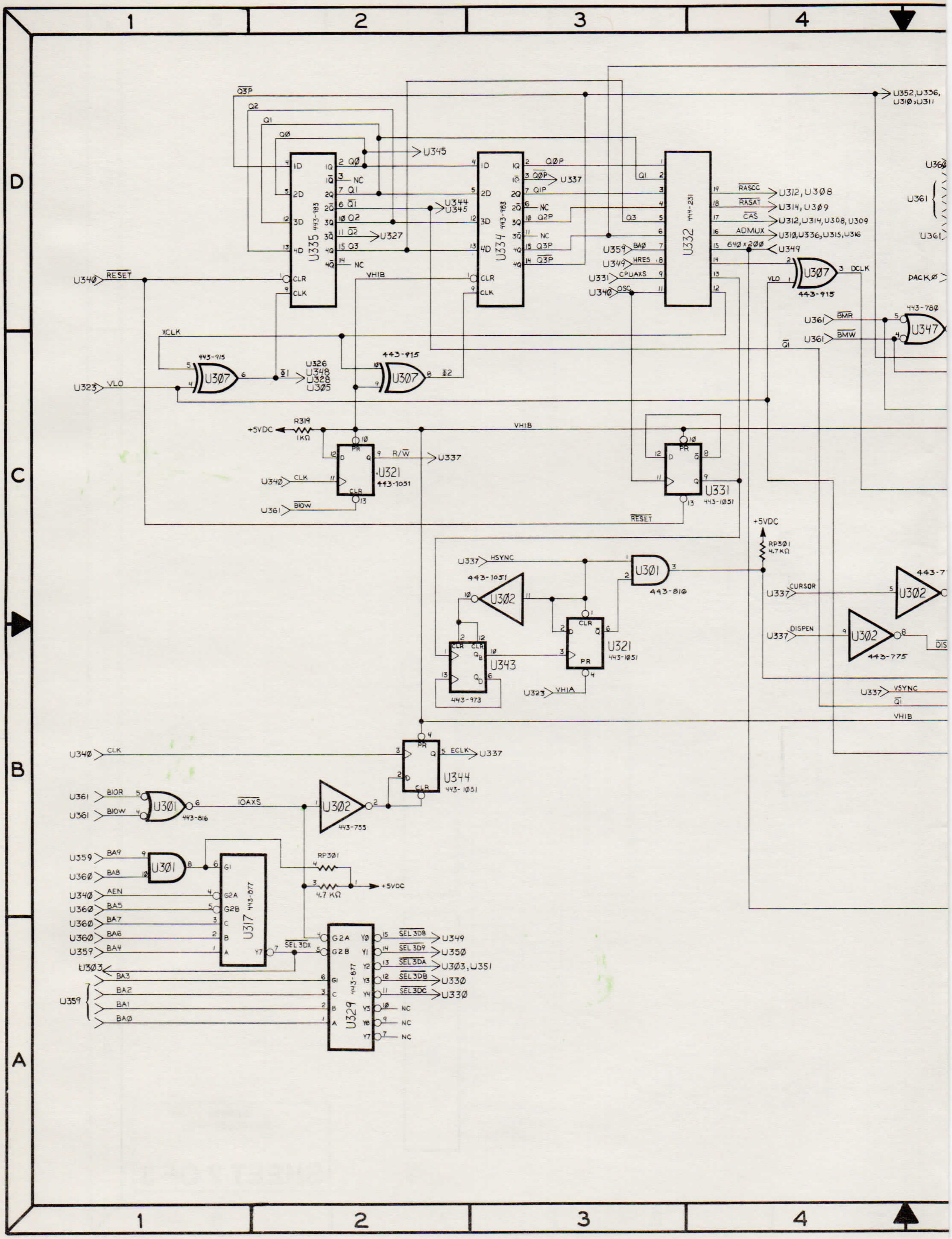

1
2
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B
A
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443-183
U332
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U331
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U302
U301
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U343
443-973
U344
443-1051
443-755
U317
443-877
U329
443-877
U347
443-780
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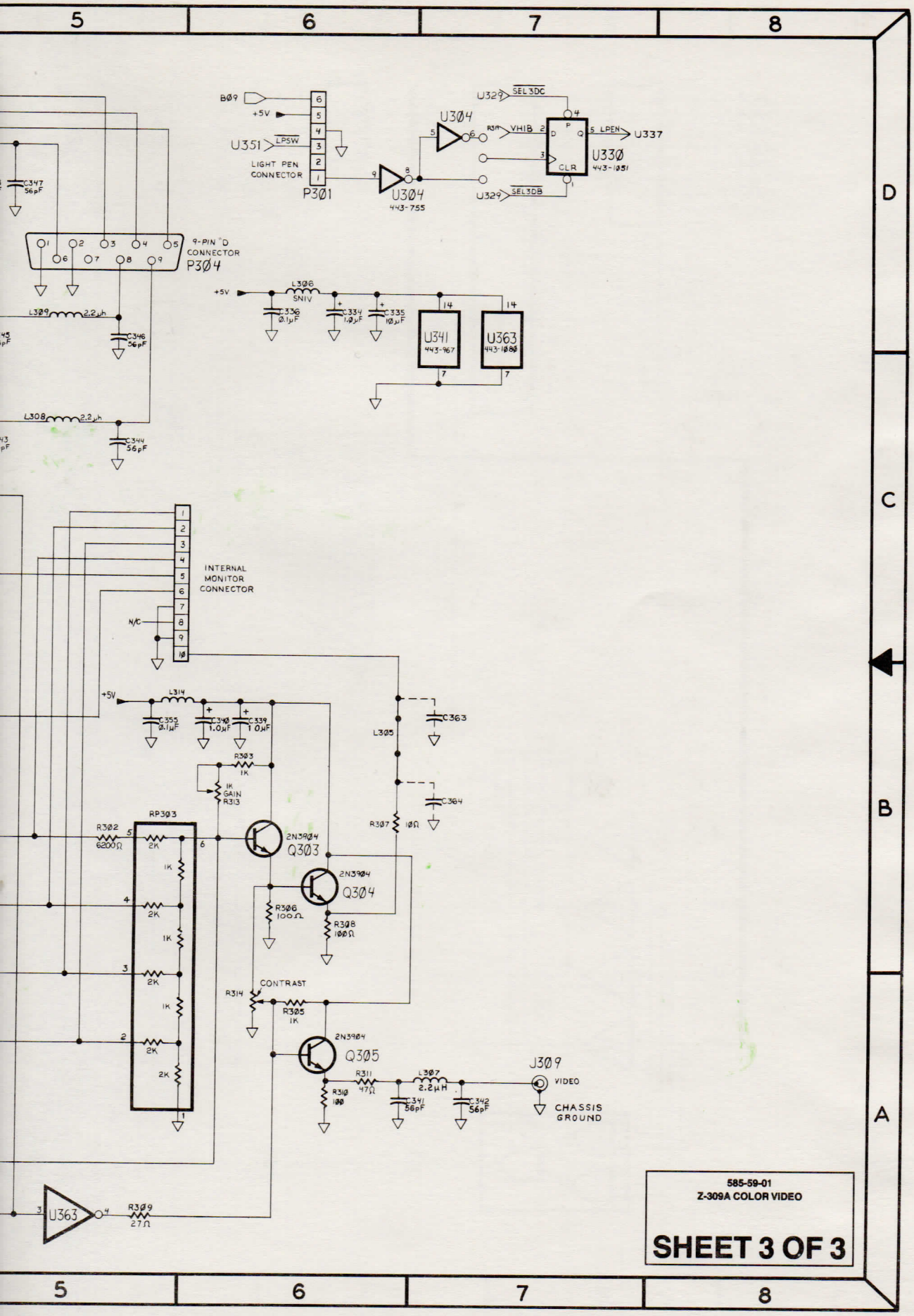
U323
VLO
VHIB
+5VDC
R319
1KΩ
R/W
U337
CLK
U361
BIOW
HSYNC
CURSOR
DISPEN
VSYNC
VHIA
RP301
4.7KΩ
RASCC
RASAT
CAS
ADMUX
640 x 200
DCLK
DACKØ
BMR
BMW
U312, U3Ø8
U314, U3Ø9
U312, U314, U308, U309
U31Ø, U336, U315, U316
U349
U352, U336, U31Ø, U311
U345
U344
U327
U326
U348
U328
U3Ø5
Q3P
Q2
Q1
QØ
QØP
Q1P
Q2P
Q3
NC
BAØ
HRES
CPUAXS
OSC
U359
ECLK
BIOR
IOAXS
BA9
BA8
AEN
BA5
BA7
BA4
BA3
BA2
BA1
U360
U303
SEL 3DX
SEL 3D8
SEL 3D9
SEL 3DA
SEL 3DB
SEL 3DC
U35Ø
U3Ø3, U351
U33Ø
4.7 KΩ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P301
U304
443-755
U329
SEL3DC
SEL3DB
U304
R3M
VHIB
LPEN
U337
U330
443-1051
CLR
9-PIN "D CONNECTOR
P304
C347 56pF
L309 2.2µh
C346 56pF
L308 2.2µh
C344 56pF
L306 SNIV
C336 0.1µF
C334 1.0µF
C335 10µF
U341
443-967
U363
443-1088
INTERNAL MONITOR CONNECTOR
N/C
L314
C355 0.1µF
C340 1.0µF
C339 1.0µF
R303 1K
1K GAIN R313
RP303
R302 6200Ω
2K
1K
2N3904 Q303
2N3904 Q304
R306 100Ω
R308 100Ω
CONTRAST
R314
R305 1K
2N3904 Q305
L305
C363
C364
R307 10Ω
J309
VIDEO
CHASSIS GROUND
R311 47Ω
L307 2.2µH
R310 100
C341 56pF
C342 56pF
U363
R309 27Ω
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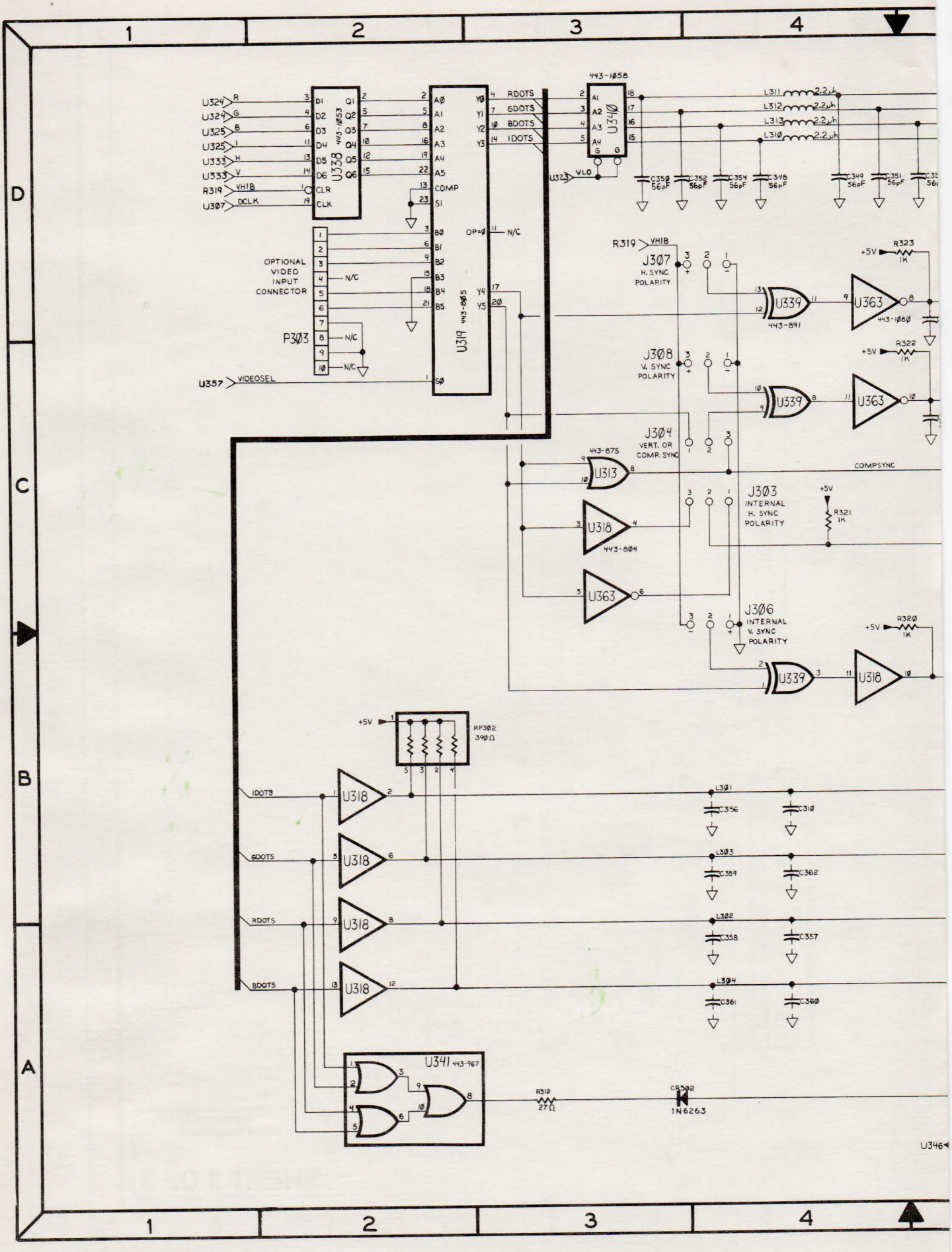
U324 R
U324 G
U325 B
U325 I
U333 H
U333 V
R319 VHIB
U307 DCLK
U338 443-1053
D1 D2 D3 D4 D5 D6 CLR CLK
Q1 Q2 Q3 Q4 Q5 Q6
OPTIONAL VIDEO INPUT CONNECTOR
P303
N/C
U357 VIDEOSEL
U319 443-805
A0 A1 A2 A3 A4 A5 COMP S1
B0 B1 B2 B3 B4 B5 S0
OP=0
Y0 Y1 Y2 Y3 Y4 Y5
RDOTS
GDOTS
BDOTS
IDOTS
443-1058
U340
A1 A2 A3 A4 G G
U323 VLO
L311 2.2µh
L312 2.2µh
L313 2.2µh
L310 2.2µh
C350 56pF
C352 56pF
C354 56pF
C348 56pF
C349 56pF
C351 56pF
J307 H. SYNC POLARITY
J308 V. SYNC POLARITY
J304 VERT. OR COMP. SYNC
J303 INTERNAL H. SYNC POLARITY
J306 INTERNAL V. SYNC POLARITY
U339
443-891
U363
443-1080
U313
443-875
U318
443-804
R323 1K
R322 1K
R321 1K
R320 1K
+5V
COMPSYNC
RP302 390Ω
L301 L303 L302 L304
C356 C310 C359 C362 C358 C357 C361 C360
U341 443-967
R312 27Ω
CR302 1N6263
U346

Data Buffer

U470 is a tri-state 8-bit data buffer. It interfaces the I/O data bus with the memory banks. When a read cycle is in progress, the buffer is in an active-read state, and takes the data word from the selected memory address and places it on the system data bus. When a write cycle is in progress, this buffer takes the data word off the data bus and places it on the memory bus for placement in the selected memory location. If neither a read nor a write operation is requested, the buffer is inactive (data does not flow in either direction). This also is the case when a memory refresh cycle is in progress.

Parity Generation and Error Detection

The parity generation and error check circuitry is comprised of U451, U457, U464, and U468. When a write operation is being processed, the parity generator looks at the 8-bit word and determines whether or not an odd number of logical ones are present. If not, the parity generator places a logical one in the corresponding memory location of the parity RAM chip of the bank where that piece of data resides. Upon a read retrieval, the 9-bit word residing at that address is again checked for odd parity. If a data loss which produces an even number of bits (i.e. an error condition) occurs, the parity generator resets a D-type flip-flop. The Q* output from this flip-flop goes out on the IOCHCK* line of the I/O bus for further error processing, by interrupting the processor.

Both parity generation and parity error checking can be disabled by software means if it is desired to determine the condition of the parity check circuitry.

Parallel I/O Port

The initial memory card also contains an interface which normally will be used for attachment of a parallel printer, but which also will support other external devices which operate in a parallel format. The interface, represented in block format in Figure 3.2, is generally comprised of a 25-pin D-type connector, an address decoder, a tri-state data buffer, three bus drivers, and three data latches. The bus drivers are used primarily to read incoming data and for error detection.

The parallel interface can be configured to assign a printer to one of two I/O ports, or to disable the interface, by means of two configuration jumpers. The data buffer acts as a traffic controller for data between the system I/O bus and the external device. Data handling and timing are under the control of the programmable array logic (PAL) IC acting as an address decoder.

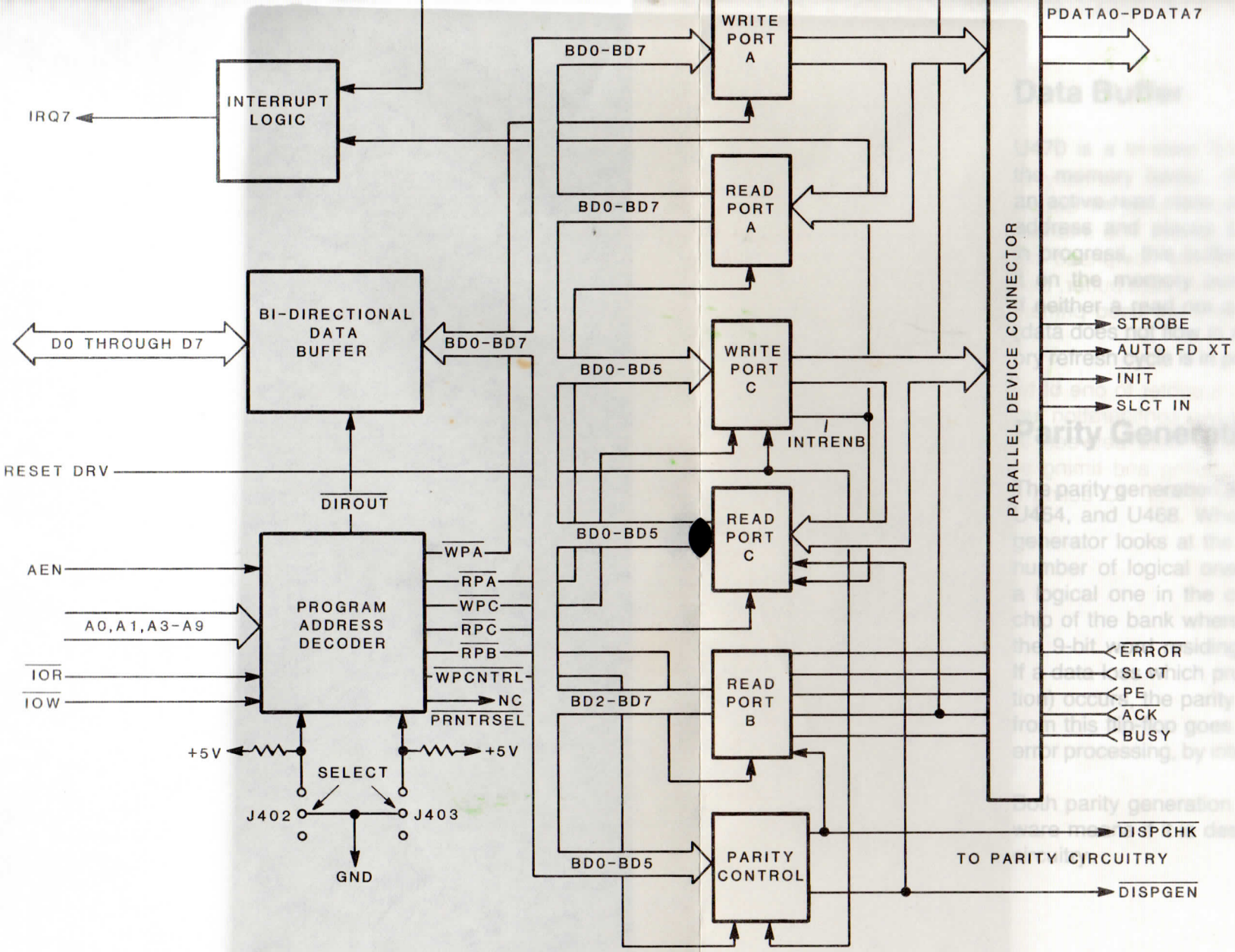

Figure 3.2. Parallel Interface Block Diagram

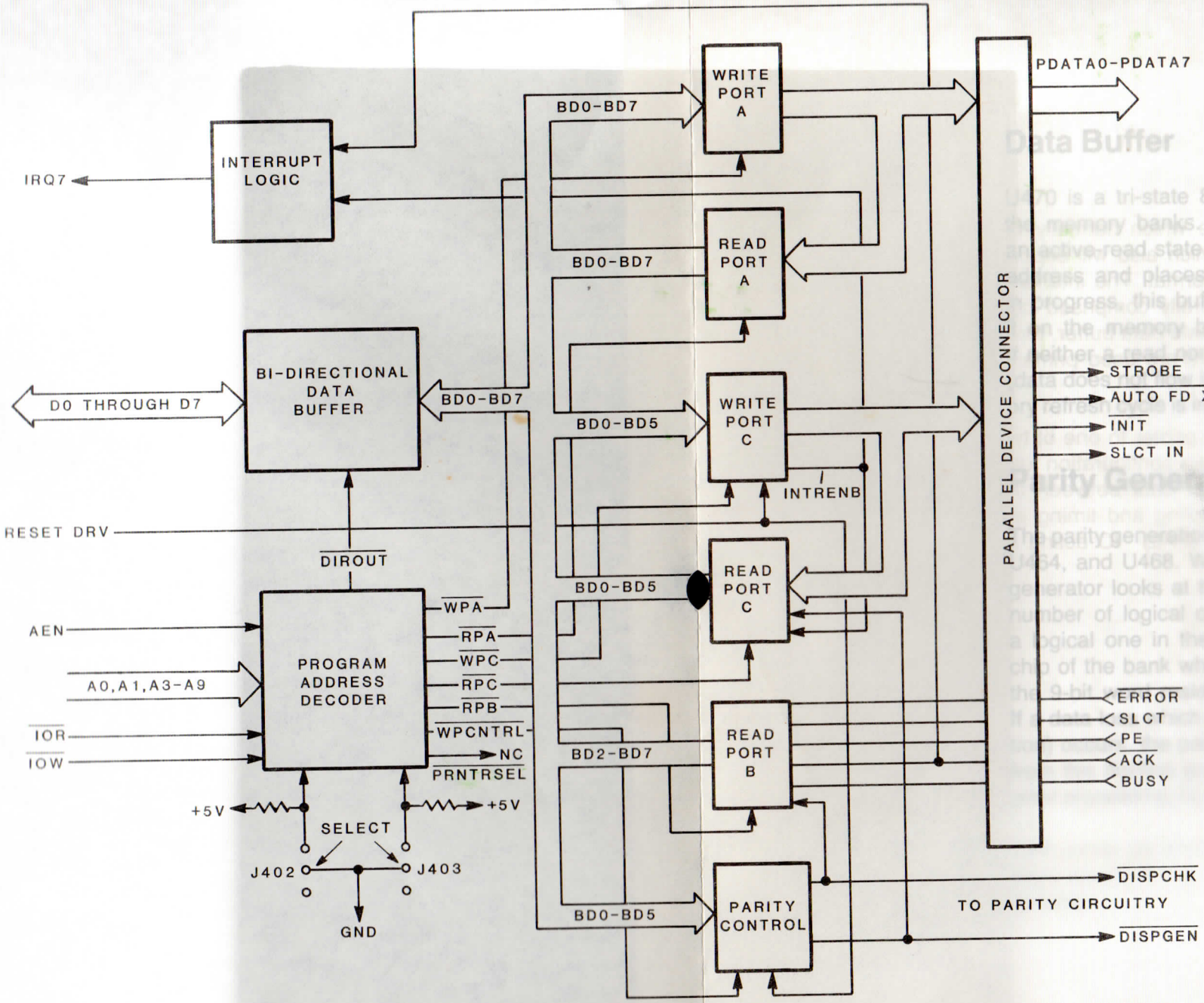

Figure 3.2. Parallel Interface Block Diagram